FLIGHT, APRIL 20, 1939 — FIRST AERO WEEKLY IN THE WORLD — MAY 6 1939

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FLIGHT

The AIRCRAFT ENGINEER

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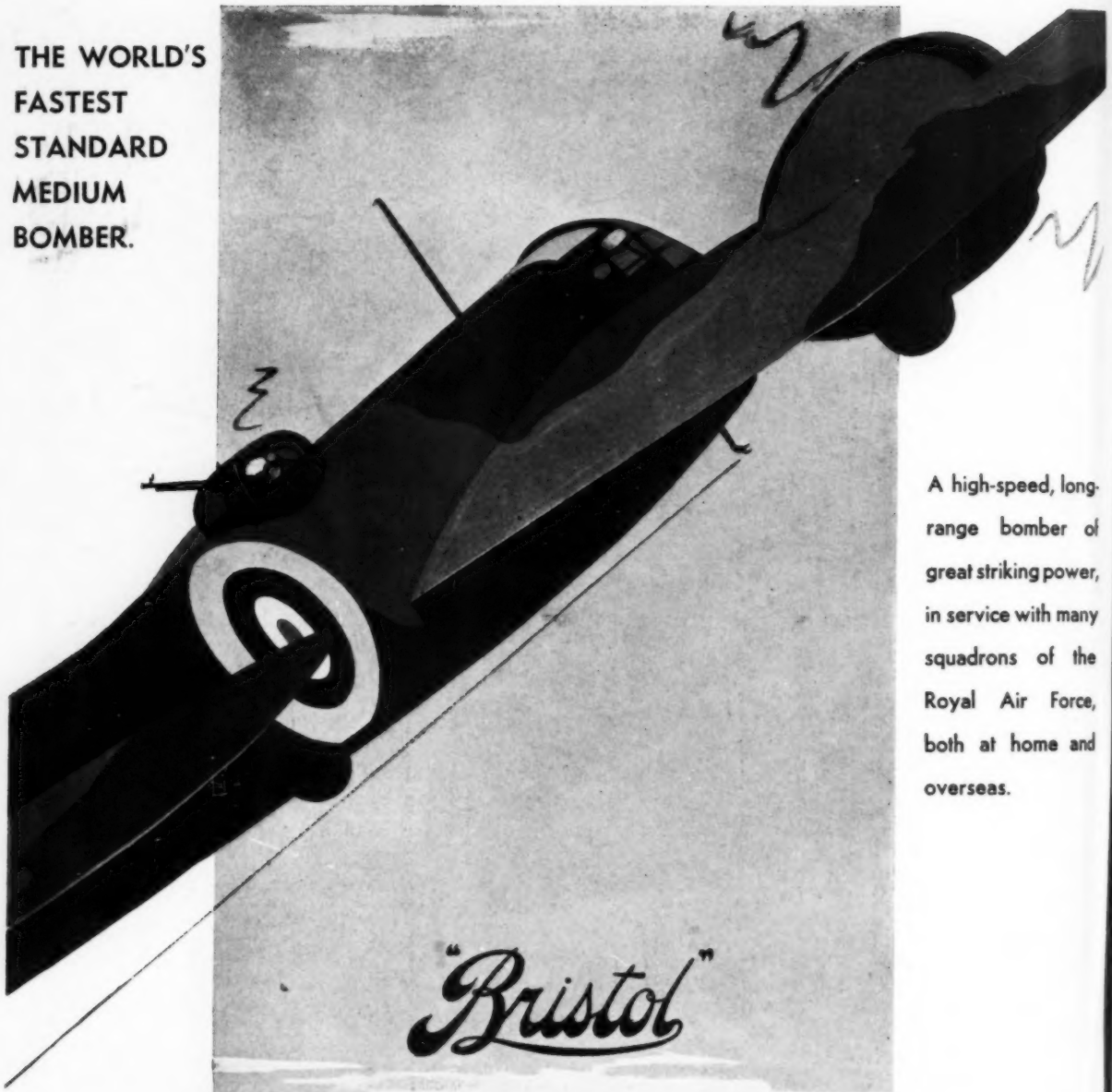

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FLIGHT
The AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

More Secrecy

THREE years ago the Air Council decided to delete from the official *Air Force List* the names of the types of aircraft with which the different squadrons of the Royal Air Force were equipped. At the time *Flight* took the view that this was an unnecessary step, which would merely make it difficult for legitimate inquirers to keep informed on R.A.F. matters, while not hoodwinking a potential enemy. All he had to do in order to find out the equipment was to send agents in motor cars past the aerodromes and wait until the machines came out.

And now the latest issue of *The Air Force List* omits all information concerning the location of squadrons and the officers serving in them. Thus it is no longer possible to decide, from the *List*, which squadrons and other operational units are administered by the different Commands and Groups.

Apart from the inconvenience caused to friends and relatives of serving personnel, who will have to write "c/o Air Ministry," just as one writes to friends in the Royal Navy "c/o G.P.O.," there is actually more sense in this latest example of secrecy panic than there has been in many others. Previously it was possible to ascertain from *The Air Force List* how many bomber, fighter, general reconnaissance squadrons and so forth we had at any given time, even if the strength of each squadron was not ascertainable except by intelligent study of the number of officers serving with the squadron.

It will still be possible for a potential enemy to send agents around the country and in that way to keep track of the number of air stations, the squadrons and their equipment, although the information is not now presented free, gratis and for nothing. But a determined foreign agent will get his information all the same, and a great deal more than he could ever get from *The Air Force List*.

Even our latest "hush-hush" machines may easily be seen by anyone. All he has to do is to drive along the main road past Martlesham Heath and wait for them to come out.

Pioneers

THE history of flying owes much to brotherly team work. In the United States the brothers Wright—Wilbur and Orville—were the first to make a practical flying machine. In France the brothers Farman—Maurice, Henry and Dick—were pioneers of aviation, as were also the brothers Voisin and Caudron. In this country early British aviation history was made by the three brothers Short—Horace, Eustace and Oswald.

It is fitting that *Flight* should, in presenting to its readers this week a history of the birth and growth of the famous Short firm, link their names with those of the other pioneer brothers who have set their stamp on the progress of flying. The Wrights and the Shorts met during the very early days, and it was to orders for Wright biplanes that Shorts owed their start as aircraft constructors on a commercial scale. That order was for six machines. Nothing to get excited about in these days when orders are placed by the hundreds, but enough to get Shorts firmly established.

With the Farman, Voisin and Caudron brothers Shorts had, we believe, no contact in those early days, but it is interesting to recall that the Farmans hail from that same county of Kent which Short Brothers have made the home of their aeronautical activities from the very start in 1909.

THE OUTLOOK (CONTINUED)

Considerations of space have compelled us to confine our history of Short Brothers mainly to the types of aircraft produced. Otherwise, an interesting tale might have been told of those early Shellbeach and Eastchurch days; of the little band of adventurers who learnt their flying over those inhospitable marshes; of their trials and tribulations; of how they formed the nucleus of the Service we know to-day, several of them now occupying high posts in the R.A.F. or in the Air Ministry.

We might have recalled how one Dick Fairey joined the firm in the early days and helped to build the quaint Dunne tailless machine. How that same Dick Fairey started his own company and became one of the world's great aircraft constructors. But that will have to wait. In the meantime, the history of Shorts of Rochester is an example of how determination and foresight can triumph over obstacles.

Much Ado

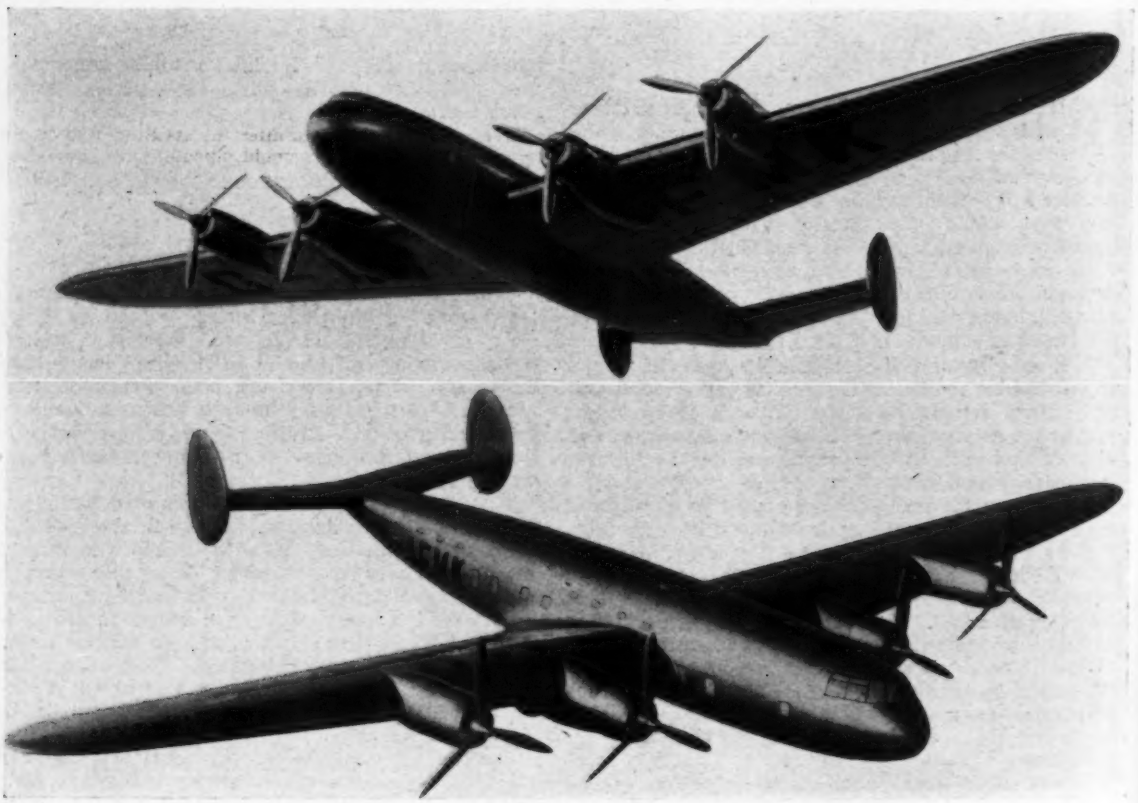
BUT for the fact that the daily newspapers let themselves go about it, and announced "Famous Airman's 2,000ft. Leap for Life," there would have been no need to devote more than a brief paragraph to recording that Mr. G. de Havilland, Jun., and Mr. Cunningham had to abandon their machine and take to their parachutes last week when the machine they were flying got out of control.

However, in view of the vast and quite unwarranted publicity given to the event, it seems desirable to place the actual facts on record. The machine in question was an experimental Moth Minor, which had been fitted with a new type of engine cowl, while the inner portions of the trailing edge of the wing had been set at a different angle at the request of the shops (evidently with a view to facilitating manufacture).

It was expected that these two experimental features might upset the airflow over the wing roots, and Messrs. de Havilland and Cunningham went up to 6,000ft. to do prolonged spinning tests timed by stopwatch. The machine was loaded to 100 lb. more than its Aerobatic C. of A. weight, that is to say, to 1,550 lb. instead of 1,450 lb., and, furthermore, the centre of gravity was in the farthest aft position. Thus the conditions were the worst possible, and it is not really surprising that the initial normal spin turned into a flat spin, out of which the machine did not appear willing to come. Mr. Cunningham jumped out at 3,000ft. and Mr. de Havilland at 2,500ft. Both landed quite safely.

It might be explained here that the engine was stopped when the two occupants jumped. Released of its load, the machine went into a dive and the engine started. Possibly the pilot kicked the switch accidentally when he jumped.

There is no reason to suppose that the production version of the Moth Minor (there are about 40 in a half-finished state at the moment) will have any vices of this nature. Spinning tests on a similar special prototype are to be continued at greater heights, and with the machine equipped with a tail parachute.



HIGH FLYER: The excellent lines of the Short 14/38 landplanes ordered by the Air Ministry may be studied in these views of a model. Fitted with Bristol Hercules engines giving 1,100 h.p. at 22,000 feet, one version (Type B), will cruise at 275 m.p.h. at 25,000 feet. More details are included in the historical article on the Short Company appearing in this issue.

THE NEW SPEED RECORD

How the Heinkel's 463.9 m.p.h. was Established and Timed

The pilot, Dieterle, was promoted to Flight Captain on breaking the record.

FURTHER details have now become available concerning the world's speed record established by the German pilot Dieterle on March 30, 1939, to which reference was made in *Flight* of April. 6. Of the machine, the constructors (Ernst Heinkel Flugzeugwerke, Rostock) say that it was "a landplane which took off from and alighted on an aerodrome measuring 1,000 m. in length and 1,000 m. in width; the record machine is no racer, but a fighter available for the German Luftwaffe; no special engine was constructed, but a normal Daimler-Benz DB 601 was used."

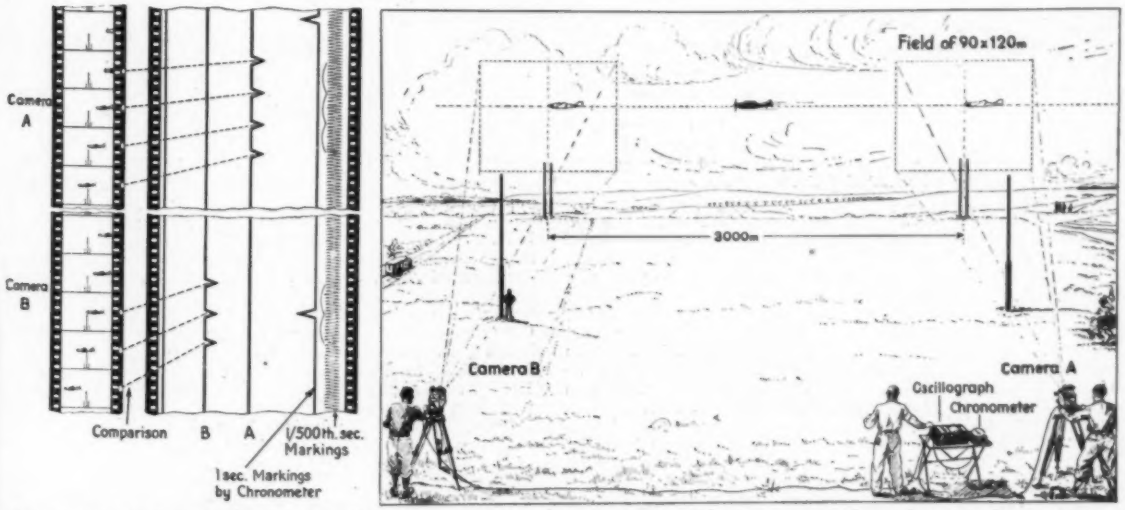
Exactly how much reliance to place on this claim is difficult to decide. Certainly a newsreel shows the machine equipped with its aerial mast and wire, and with Service markings. On the other hand, some snapshots received from Germany, and apparently taken on the day of the record, show a machine without an aerial mast. It is difficult to believe that a machine attacking the world's speed record would be anything approaching a standard fighter. Again quoting the manufacturers, the record machine was a direct descendant "of the He.70, the He.111, the He.112 and the fighter type He.112 U." On the last named General Udet established a speed of 635 km./h. (394.6 m.p.h.) over a 100-km. course.

This is how the Heinkel people describe the evolution of the record-breaking machine: "By further refinement of the aerodynamic form, and by improvements in the V.D.M. airscrew, we succeeded in materially increasing the performance without increasing the power of the engine." By the beginning of March the machine was in readiness at the Heinkel aerodrome at Oranienburg, near Berlin, but weather conditions were unfavourable and would have interfered with the accuracy of the timing. On the morning of March 30 the weather cleared and preparations were made for the record attempt.

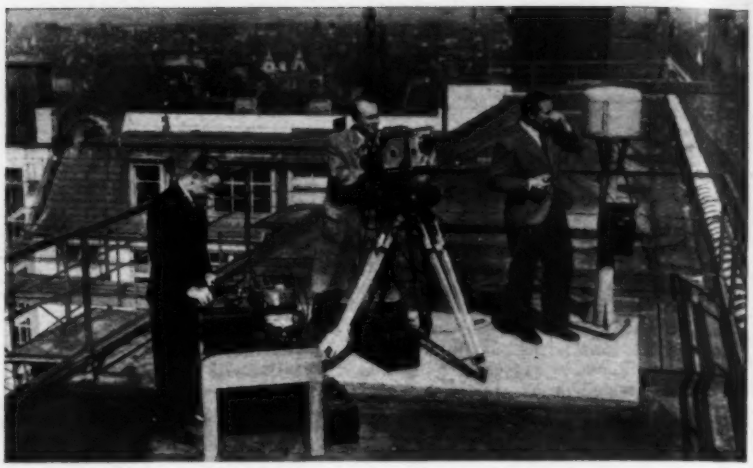
The F.A.I. regulations stipulate that for speed record purposes the flight must be made over a course 3 km. (1.86 miles) long This is the distance over which the machine is timed, and while traversing it the aircraft must not exceed a height of 75 m. (264ft.). Before entering the 3,000 m. course the machine must pass through an approach 500 m. (1,640ft.) long, on which also the height must not exceed 75 m. The timing is done in two flights in each direction and the average speed of the four runs taken.

While turning at the end of each run the pilot may fly as wide as he likes, *i.e.*, any radius of turn may be used, but the machine must not at any time during the turn exceed a height of 400 m. (1,312ft.). Other aircraft flying at exactly 400 m. are used for checking that this stipulation is observed.

On the day of the record flight the preparations were completed by 5.15 p.m. and the aeroplanes carrying the official observers went up. Dieterle took off at 5.23 p.m. After completing his two runs in each direction he made a perfect landing 14 minutes after the start. Although the official speeds of the runs could obviously not have been known to him, he must have been certain that he had beaten the record, for on leaving the machine he turned three handsprings in the exuberance of his youth (he is only 24). When the speeds had been worked out it was found that the average was 746.66 km./h. (463.953 m.p.h.) The machine



On the left are shown the film and oscillographs strips and the method by which the time is read off against the image of the machine. On the right is a diagrammatic representation of the Askania timing system. The distance between the posts is not, of course, to scale.



One of the Askania timing outfits.

took only 14.464 sec. to cover the timed section.

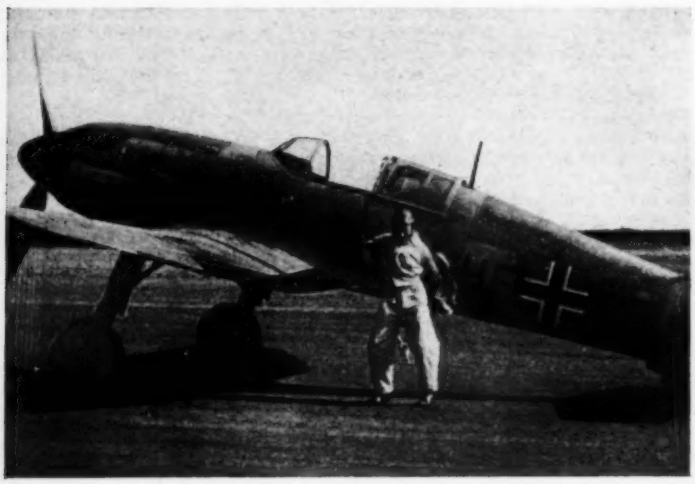
Field Marshal Göring immediately promoted Herr Dieterle to Flight Captain: he is the youngest pilot to hold that rank in the German Luftwaffe.

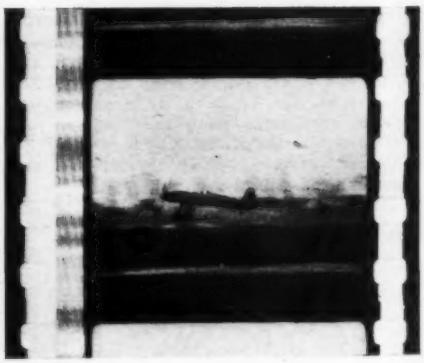
Timing of the record was done with special outfits designed by the Askania Werke of Berlin. The sighting posts were set in concrete, two close together near the course and a third nearer a ciné camera. There were, of course, two of these timing stations, one at each end of the 3-km. course. When the camera was pointed at the sighting posts the near one appeared taller than the two far ones, owing to perspective, although they were all of the same height—32.8ft.

The Askania ciné cameras were of the "slow motion" (actually, high-speed) type, in which as many as 100 frames per second can be taken. The angle of the ciné objective lens was so chosen that a picture field 90 m. by 120 m., referred to the near sighting post, was photographed on the film. Electrically connected to the cameras were an oscillograph and a chronometer.

By each camera stood an observer, who was informed by field telephone of the distance of the aeroplane at any moment from the sighting posts. When the machine entered the field of the camera the observer started the electric timing mechanism by which, in addition to the pictures taken by the ciné camera, exposures were made on the oscillograph strip and time marks made every second. By comparison of the continuous curve on the oscillograph strip, ciné film, and a contact chronometer, a time picture was thus obtained. When the machine had passed out of the picture-field the camera was stopped and the camera at the other end of the course started.

It should, of course, be understood that the two timing posts at the ends of the course had their equipment synchronised.





Two shots from the Pathe Gazette newsreel. The machine shown in it has a radio mast. Those unfamiliar with ciné technique will be interested in the sound track in the picture below

WEST HARTLEPOOL OPENING

IN order to take advantage of the increased delivery which will now be practicable, large additional orders for aircraft are to be placed in this country., This statement was made by Sir Kingsley Wood at the luncheon which preceded the official opening of West Hartlepool's new civic airport at Greatham last Saturday. "Our programme last year was by far the largest in the history of the R.A.F.," he said. "It was more than double that of any previous year, and, more than 17 times that of any typical pre-expansion year."

Sir Kingsley went on to say that though the R.A.F. entries were satisfactory, more than 70,000 men and boys would be needed for the Volunteer Reserve and for the auxiliary forces during the present year. Pilots for the R.A.F. Reserve were particularly needed.

Lord Londonderry, a former Air Minister, who, as honorary president of the flying club to be established at West Hartlepool, was "greeted as landlord should greet a good prospective tenant," said that while he was at the Air Ministry they were faced with financial difficulties in regard to the development of civil aviation, but, even so, he had felt that they should avoid what he would term spoon-feeding. Local authorities were left to exercise their initiative, and West Hartlepool had shown it was not lacking in that respect.

The Air Minister, who flew from London in an Air Council D.H.86 B, was accompanied by Lord Londonderry, Lt.-Col. Sir Francis Shelmerdine (Director-General of Civil Aviation), Air Marshal C. L. Courtney and Mr. F. H. Sanford (private secretary).

A wind strength of something like 40 m.p.h. rather upset the programme for the aerial display which preceded and followed the luncheon, but the pilot of a visiting Spitfire was at least able to show the machine's paces downwind. The Battles of No. 185 (B) Squadron, from Thornaby, which has just been "adopted" by West Hartlepool under the recent scheme, flew past in squadron formation.

Prior to his departure the Air Minister made a quick tour of the airport, which has been built at a cost of £40,000. There is hangarage for 36 machines, two hangars having been put up by the Air Ministry for the R.A.F. Volunteer Reserve School, and a third is to be erected for the machines of the flying club and visiting aircraft. Arrangements have been made for the new club to train members of the Civil Air Guard.

COMMERCIAL AVIATION

"Flight" photograph.

TUCKED UP: The Percival Q6 in its latest form, with undercarriage retracted. This machine is one of two for Australia.

THE WEEK AT CROYDON

"A. Viator." in His Air Transport Commentary, Discusses the Need for Tarmac Organisation, and Remarks on Various Traffic Figures

FROM my "window in Thrums" I see the beginning of a tarmac congestion which will become increasingly difficult to deal with as time goes on and will necessitate a definite system of numbered berths to be allocated to departing machines. Arriving aircraft really ought to pull up in a space allocated to arrivals only, because at the moment it is possible for a machine which is being unloaded to block the egress of one departing.

There are in summer over a hundred daily arrivals and departures from Croydon, and what makes it worse is that departures (and, to a lesser extent, arrivals) tend to bunch at the same time of day. Services with long-distance connections to maintain must all start around 8.45 to 9.30 a.m. Departures made earlier do not suit air travellers. Unlike the elderly gent in the fruit-salt advert., air passengers do not seem to awake with the lark and spring straight up to the ceiling wide awake and with an expression of mingled alarm and agony on their faces.

Providence, working in its usual mysterious way, has so ordained that the Croydon tarmac is not, at these peak periods, thronged with huge Ensigns, but next summer, what with the Douglas D.C.4 and, perhaps, the new Fairey air liner, the chances are that some aeroplanes will have to unload in the vicinity of Croydon Town Hall.

Incidentally, the popularity of the D.C.3 was well illustrated on the tarmac the other day, when there were no less than four house flags of different national companies flying from four of these machines at the same time. There was the K.L.M. orange, white and blue, with the company's crest in black—and in passing I may mention that this flag, except for the crest, is, I understand, the ancient Merchant Service flag of Holland. Then there was the Swissair flag, a white cross on a red ground, and that of Sabena, colourful with its triangles of black, red, yellow and blue divided by white, and with a white star thereon. Last, but not least, there fluttered the Swedish Air Lines' house flag of neat yellow and blue with the A.B.A. speed bird. I should have been glad to see the flag once more, also upon a D.C.3, of that gallant but ruthlessly suppressed company, the Czechoslovakian Air Lines.

Easter air traffic was amazing in spite of the rumblings from certain huge and powerful countries that they were in danger of being attacked by very small, weak nations and might have to obliterate the latter in sheer self-defence. Imperial Airways seem to have regained their lead on the Paris run, for the moment anyway, for holiday figures showed Imperials 520 to Paris and 433 back, Air France 365 to Paris and 345 return, whilst British Airways had 165 to Paris and 167 back. Mystery surrounds the fate of the hundred odd who did not come back, but perhaps they are jolly souls whose party was on such a scale that they don't yet realise that the holiday is over.

Passenger traffic keeps up in spite of the temporary falling off of the refugee business, but the most popular route, I learn from all sides, is to and from Paris. People are flocking to Paris from Scandinavia, from Holland and from England.

"Gawld Flyke," the yellow horse used to brush the tarmac with a rotary brush, is wise in the ways of aeroplanes. One landed so close over his head that he definitely prepared to lie down. None of your startled rearing-up and bolting about our wily quadruped, and he will stop when necessary and let people land under his nose and across his bows.

The Wright Way

Wrightways gave me a few interesting figures for 1938. In that year they carried 1,149,813 lb. of freight and 612 passengers. They made 3,642 flying hours, which is a stout effort, worthy of much praise. I am sorry to learn, incidentally, that our old friend Capt. Duggan has left Wrightways. He has been with the firm since the start.

The Venice-Milan-Paris-London service of Avio Linee Italiane started last Sunday, and it was quite a treat for the Sabbath crowd in the main hall to see such resplendent uniforms. The price of bar gold, if bars on sleeves and what not are any criterion, must have eased somewhat in Italy lately.

It happened, as usual, that a pilot of a certain airline forgot to alter his watch on Saturday night, so that the ground staff had to rush across to the hotel and remark, re early tea, "Ah fill the cup, what boots it to repeat, how time is slipping underneath our feet," and again, this time to the slumbering pilot, "Awake, for morning in the bowl of night has flung the stone that puts the stars to flight, and lo! the Hunter of the East has caught the Sultan's turret (or control tower) in a noose of light."

Commercial Aviation

The Lockheed Sixteen

IN direct competition with the D.H.95 and the Douglas D.C.5, the Lockheed Company are now in process of developing a new "secondary airline" machine—the Lockheed Sixteen. Plans for a four-engined transport machine—something of a departure for the company—are still somewhat incomplete.

The Tankers Go Across

LAST week the two converted H.P. Harrows, which are to be used for refuelling the modified "C"-class boats in Newfoundland, left for Canada in the S.S. *Beaverford*. At the same time, four members of the Flight Refuelling staff also left England for Newfoundland.

One of the two pilots, Flt. Lt. H. C. Johnson, is already in Canada, and the other, Flt. Lt. J. Atkinson, was to leave this week. The two Harrows, which had previously been stationed at the F.R. centre at Ford aerodrome, were dismantled at Hamble and will be unshipped at Montreal before being flown over to Hattie's Camp, Newfoundland. Two other Harrow tankers are being prepared for use at Rynanna, the Shannon airport.

Reorganising Australian Aviation

EARLY this month Mr. A. B. Corbett began his new duties as Director-General of the Australian Civil Aviation Department in Melbourne. He was previously Deputy Director of Posts and Telegraphs in Queensland, and is sixty-two years old. He will presumably have to face the considerable task of putting into effect some or all of the reorganisation recommendations made by the Government committee which enquired into the *Kyeema* disaster last year.

This committee, amongst other remarks, criticised the administration of the Civil Aviation Board, which has now been abolished; recommended the appointment of "flight-checking officers" at the larger airports; and urged that the rules and regulations contained in the ordinary airline companies' operations manuals should be given the sanction of law.

Until now little has been done by the Federal Government about these recommendations, so that Mr. Corbett faces the job of finding ways and means by which Australian civil aviation may be more efficiently organised. He has a negligible experience of aviation, but a record of outstanding technical and administrative ability which, in the opinion of the majority of people out there, more than compensates for his inexperience in aviation matters. After all, what is needed is a long-range plan covering future development. Once the plan has become law it is up to the departmental experts to carry it into practical operation.

Summer Acceleration

LAST Sunday Imperial Airways started their summer Empire air route schedules with services out of Southampton every day except Tuesday—the boats for Kisumu and Durban leaving on Wednesdays, Fridays and Saturdays; those for Karachi leaving on Mondays, Wednesdays, Thursdays, Saturdays and Sundays; and those for Sydney leaving on Wednesdays, Thursdays and Saturdays.

Between Southampton and Sydney the three-day winter schedule to Basra is being replaced by a two-day schedule, while the three-day schedule between Calcutta and Sourabaya, necessitated by mid-year weather conditions, is being reintroduced. The inclusive travelling times are: Southampton-Sydney, 9 days 2½ hr.; Sydney-Southampton, 9 days 14½ hr. At the same time the African services are being speeded up, Kisumu being reached from Southampton in 3½ days, and Durban in 4½ days.

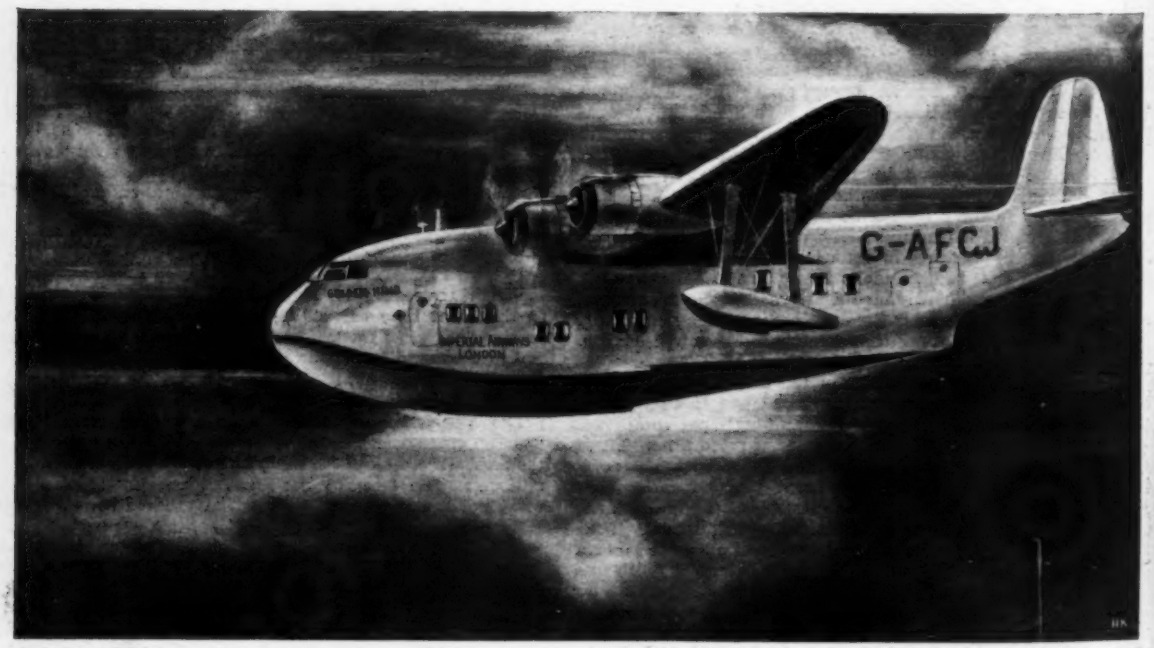
Eighteen Rapides

IN a recent issue it was explained that two D.H. Rapides had been purchased by the new air survey amalgamation, and three similar machines by the Air Ministry for radio navigational training. Other recent orders for the type include one of nine machines from Airwork for navigational training at their schools, six for D.E.T.A., the Portuguese East African Government airline concern, and two, which have just been delivered, from Alpar, in Switzerland.

The Divasao de Exploracao dos Transportes Aereos (D.E.T.A.) began operations in Portuguese East Africa in 1937 with a couple of Rapides, a Dragonfly and a Hornet. Last year they purchased two more Rapides and three Junkers Ju. 52s. Their Rapide fleet now numbers six.

The Alpar Schweizerische Luftverkehrs machines have been equipped for 5-6 passengers and have separate radio operators' compartments. This company has been in action for about ten years, during the last six of which it has been operating an internal line between Zurich, Berne, Lausanne and Geneva. This is run three or four times daily during the summer and connects with the international services. The company also runs a special service between Berne and La Chaux-de-Fonds, and a twice-daily service between Berne and Basle. It is for the last that the two new Rapides are largely required, though they will also be used for pleasure flights over the Alps and for ambulance work

Alpar's fleet at present consists of two Koolhoven Fk. 50s, one Fokker F. 11, one D.H. Leopard Moth and two Swiss-built Comte machines, the A.C 4 and the A.C. 8. The two new Rapides were flown away from Hatfield by Capt. Pierre Sauge, the chief pilot, and by M. Pierre Robert.



GOLDEN HIND: A *Flight* drawing anticipating the appearance of the *Golden Hind*, one of the three Short "G" Class flying boats for Imperial Airways. She will be considerably longer than her Elizabethan namesake and will weigh rather more than 32 tons. Drake's vessel was probably of about 100 tons. Note that the rear step follows Sunderland practice rather than Empire boat design. The engines are four Bristol Hercules.

AIRLINES TO-DAY

NEXT week's issue of *Flight* will be a Special Number of great value to all interested in airline operation. Its main subject will be

COMMERCIAL AIRCRAFT AND AIRLINES.

Contents will include data on current commercial aircraft, engines and equipment, a guide to the air transport companies of the world and, last but not least, a new and up-to-date loose-inset photogravure map, suitable for wall mounting, of the world's air routes.

Next Thursday FLIGHT *April 27*

North-Easterly Speed-up

THIS year's North of England services run by North-Eastern Airways have been reorganised both to decrease the travelling time between London and Scotland, and also to make the times of arrival and departure rather more convenient for the normal business traveller.

The service will leave London at 3.15 p.m. to allow connections with the incoming Continental services, and will be non-stop to Newcastle, the other stopping points being the new airport at Grangemouth (between Edinburgh and Glasgow), Perth, and Dyce, Aberdeen, which will be reached at 7.50 p.m. The entire journey, including stops, will occupy only 4¼ hours.

The returning machine will leave Aberdeen at 8.15 p.m. and arrive at Croydon at 12.50 p.m.—again in time to make all Continental connections. At Perth on the southward journey the departure time is such that Scottish Airways' passengers from the Orkneys, Wick and Inverness will be able to change machines. In other words, passengers from the far north will be able to reach practically any city in Europe in one day.

The Boeing Returns

AT 8.7 a.m. last Thursday morning the Boeing 314, *Yankee Clipper*, left Southampton Water for Lisbon on the first stage of the machine's return journey to Baltimore. The machine reached Lisbon at 4.15 p.m., and left on the following day for Horta in the Azores. Baltimore was reached, via Bermuda, on Sunday morning, after a night flight from the Azores.

Previously the Boeing had been taken over to Foynes and had made a special detour in order to permit the three C.A.A. officials to make an inspection from the air of the new Shannon airport. Capt. Gray, his crew and the various officials were received by the secretary of the Eire Department of Industry and Commerce, Mr. Sean Leydon, and other representatives of the Government, including the Director of Meteorological services. After visiting the local D/F station at Foynes, the party was taken over to the long-distance long- and short-wave radio station at Ballygireen and to the airport at Ryunna. The latter, by the way, is almost ready, and 1,400 yards of the main runway can now be used.

Before returning to Southampton on Wednesday of last week the four two-row Cyclones were run up while the machine itself was held by a hawser from the Foynes jetty. This fact is interesting in that one of the difficulties of flying-boat operation is that involved in warming and running-up the engine—work which usually has to be done while taxying in circles, the pilot avoiding obstacles as well as he can.

"*Flight*" photograph

INAUGURAL LOAD: Four of the passengers on the first British Airways service from Heston to Berlin and Warsaw. From left to right they are: Mr. Z. Merdinger and Lt. Col. J. B. Kwiecinski, of the Polish Embassy, Sir Francis Shelmerdine and Maj. J. R. McCrindle, the managing director of British Airways.

The New European System

ON April 17 British Airways' new European services were started, and the first machine on the Budapest run left Heston at 11 a.m. An hour later another Lockheed 14 left for Berlin and Warsaw, carrying, among others, Sir Francis Shelmerdine, the Director-General of Civil Aviation, and members of the Polish Embassy in London. Details of the new services London - Berlin - Warsaw, London - Frankfurt - Budapest, and London-Brussels, were given in *Flight* of March 16. The London-Paris service is operated jointly by British Airways and Imperial Airways, with eight return services every weekday; D.H. Frobisher-class machines are used.

"*Flight*" photograph

BUDAPEST-BOUND: A Lockheed Fourteen taxying out to take off for the first Frankfurt-Budapest run. Notice the fixed "letter-box" slots near the wing tip and Heston's major obstruction—the Southall gasholder.

FROM the CLUBS and SCHOOLS

LONDON.

FLYING time for the past fortnight amounted to 158 hr. Messrs. W. Gatward, S. F. Beadman and D. H. Jeffs have gone solo, while Mr. A. E. H. Cosham has passed his "A" licence tests. Mrs. Berger and Capt. Sherlock have joined as club members.

YAPTON.

More than 113 hr. were flown in club aircraft during the fortnight ended April 15. Over 65 C.A.G. members are now under instruction.

PORTSMOUTH.

During the fortnight ended April 15 the club's aircraft flew 168 hr. Thirty-two C.A.G. members have now qualified for their "A" licences.

BRISTOL AND WESSEX.

The flying time for the week ended April 14 amounted to 61 hr. 10 min. Miss E. Donisthorpe and Mr. C. B. Wimbury have gone solo.

HAMPSHIRE.

During March 208 hr. were flown by club aircraft. Thirty-five C.A.G. members have qualified for their "A" licences. The club now possesses a fleet of eight aircraft.

DONCASTER.

Heavy winds and low clouds prevented instruction on two days of last week, during which period 64 hr. were flown. Messrs. Spittlehouse, Barker and Cartlidge have gone solo.

MARSHALLS.

The total flying time for the past week amounted to 92 hr. Messrs. Glassborow, Reymond, Street-Porter, Cooper, Smith and Pitman have gone solo, while Mr. J. Hiscock has passed his "A" licence tests.

IPSWICH.

Over 82 hr. were flown in the fortnight ended April 11. Mr. C. H. J. Brown has gone solo, while Lady Eve Balfour has passed her "A" licence tests. Suffolk played Cambridgeshire at the club's squash courts.

WEST SUFFOLK.

Twenty hours' flying time was recorded last week. Sir W. Lindsay Everard visited the club last Thursday. Miss Meadows, Messrs. J. F Sharp and N. M. Bird have joined the club. Mr. E. M. Prentice has been appointed an instructor.

NEWCASTLE.

Over 158 hr. were flown by the club's aircraft during the fortnight ended April 13. Messrs. J. A. Davidson, R. L. R. Lowes and T. B. Horesley have gone solo, while Messrs. W. Miller and O. A. Eagling have passed their "A" licence tests.

WESTON.

A total of 187 hr. was recorded during the fortnight ended April 11. Messrs. R. D. Cæsar, D. H. Fry, R. J. Steer, Miss Emery and Mrs. Gregory have gone solo, while Messrs. D. Salisbury and F. S. Fry have passed their "A" licence tests.

CINQUE PORTS.

Fine weather at Easter helped to bring the flying time for last week up to 87 hr. Two members of the C.A.G., Mr. N. Campbell and Mr. F. W. Thompson, have passed their "A" licence tests, while Mr. A. S. Edwards has gone solo.

HERTS AND ESSEX.

The flying time for the fortnight ended April 14 amounted to 223 hr. 50 min. Messrs. S. N. Goddard, J. Dellow, A. E. Foster and W. B. Ellis have completed their "A" licence tests. In the C.A.G. section six members have passed similar tests and eleven have gone solo.

PLYMOUTH.

Messrs. P. H. Stanton and A. T. C. Hazeldine have gone solo. During the fortnight ended April 11 185½ hr. were recorded.

BEDFORD.

Messrs. A. Beaton and M. H. Pinder have joined the club as new members. Mr. H. M. Kendall has passed his "A" licence tests, while Mr. R. W. H. Leeke has renewed his licence. There are still vacancies in the C.A.G. section of the club.

EXETER.

During the fortnight ended April 11 185½ hr. were recorded. Messrs. M. Banning, G. Summerfield, M. E. Morey, H. J. Scanes, H. Mortimore, G. F. Poulter, G. B. Davie, W. G. Foxall, D. F. Currie and Miss H. M. Heal went solo. Of this group five have already passed their "A" licence tests.

WITNEY.

Flying time for the month of March amounted to 130 hr., while for the first fifteen days of April 114 hr. 50 min. were recorded. Messrs. J. Kirtland, C. P. Walde, J. S. Wood, C. T. Harris and Ruvi Batra have passed their "A" licence tests. The club now possesses a fleet of six aircraft.

HANWORTH.

Over 242 hr. flying time was recorded during the fortnight ended April 15. Messrs. F. Stewart, R. E. Wigg, G. E. Spencer, F. Brookeman and Lt. Crabb have gone solo. "A" licences have been obtained by Miss B. H. Rowden, Messrs. S. K. Kingshott, H. Marshall, C. P. Nicholson, S. Farrington and C. C. Young.

ROMFORD.

During the last fortnight 115 hr. were logged by club aircraft. Messrs. Noakes, Webster, Onslow, Polley and Tucker have qualified for their "A" licences. Mr. C. W. A. Scott attended the club's C.A.G. section dinner at Maylands last week. Ten members of No. 6 (Romford) Sqn., A.D.C.C., will attend Cambridge for a gliding course.

HORTON KIRBY.

During the period April 3 to April 14 over 80 hr. were flown in club aircraft. Messrs. R. E. Pearson and G. W. Smallwood have gone solo, while Mr. R. T. Dew has passed his assistant instructor's tests. There are still vacancies for the C.A.G. section. Messrs. P. Kane, A. W. Weyman, J. Millar and E. Salzman have joined as club members.

THANET.

During the last week of the fortnight ended April 11 137 hr. were recorded—a record for Straight-operated clubs. The total for the fortnight was 239 hr. Messrs. R. Aspden, W. R. Sharp, J. D. D. Watt, H. A. Green, P. C. Gittings and G. W. Grey have gone solo. Messrs. H. S. Foulds and L. B. Davies have passed their "A" licence tests. The C.A.G. section will hold a dance on April 27.

BROOKLANDS.

Ten machines from Brooklands paid a luncheon visit to West Malling last Sunday. Messrs. F. Shirley Fox and C. Nepean Bishop are taking instructors' courses. Last week 130 hr. flying time was recorded. During this week No. 11F (Brooklands) Sqn., A.D.C.C., will march through Woking headed by the local ex-Servicemen's band. On Sunday next the first "Dawn Patrol" will be held at Brooklands between 8.15 a.m. and 9 a.m.

SOUTH COAST.

Flying time at Shoreham last week amounted to 73 hr., while at Storrington 35 hr. were recorded. Mr. D. Newton has qualified for his "A" licence. A dance will be held on April 22. The first of this year's club competitions, the Gorringe Trophy, will take the form of a triangular course cross-country handicap. In the Civil Air Guard section, Mr. C. E. N. O'Rourke has passed his "A" licence tests and Mr. V. R. N. Ryan has gone solo.

(Club Notes are concluded on p. 401.)

Forthcoming Events

APRIL.

Fri.,	21st.	Norfolk and Norwich Aero Club: Annual Dinner and Dance.
Sat.,	22nd.	Aero Golfing Society: Match v. R.A.F., Martlesham and Felixstowe.

MAY.

Thurs.,	4th.	R.Ae.S. Lecture*: "Strength of Thin Metal Construction," by H. L. Cox.
Fri.,	5th.	Official opening of Guernsey Airport by Sir Kingsley Wood.
Sun.,	14th.	R.Ae.S. Garden Party, Fairey's Great West Aerodrome.
Mon.,	15th.	"The High Ball"—Air League Dinner and Dance, Grosvenor House, London.
Tues.,	16th.	Aero Golfing Society: "Flight" Trophy, Wentworth.
Sat.,	20th.	Empire Air Day.
Thurs.,	25th.	R.Ae.S. Wilbur Wright Memorial Lecture by Dr. G. W. Lewis.
Sat.,	27th.	London-I.O.M. Race.
Mon.,	29th.	Manx Air Derby and Tynwald Race.

JUNE.

Sat.,	10th.	Brooklands Flying Club "At Home."
Sat.,	17th.	Official opening of Derby Municipal Airport (Burnaston) by Sir Kingsley Wood.
Wed.,	21st.	Aero Golfing Society: Jubilee Cup, Berkshire Golf Club.
Sat.,	24th.	Royal Air Force Garden Party.

JULY.

Sat.,	8th.	Official Opening of Birmingham Airport (Elmdon) by H.R.H. the Duchess of Kent.
Sat.,	8th-Sun., 16th.	National Gliding Contests, Great Hucklow.
Sat.,	8th-Sun., 23rd.	Brussels Aero Show.
Sat.,	15th.	Gosport Reunion, Brooklands.
Sat.,	29th-Sun., 30th.	Frankfurt International Flying Meeting.

AUGUST.

Sat.	12th.	Eastbourne Flying Club: Flying Display and Garden Party.

SEPTEMBER.

Sat.,	2nd.	King's Cup Race and Wakefield Trophy Race, Birmingham.

* This lecture takes place at 6.30 p.m. at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1.

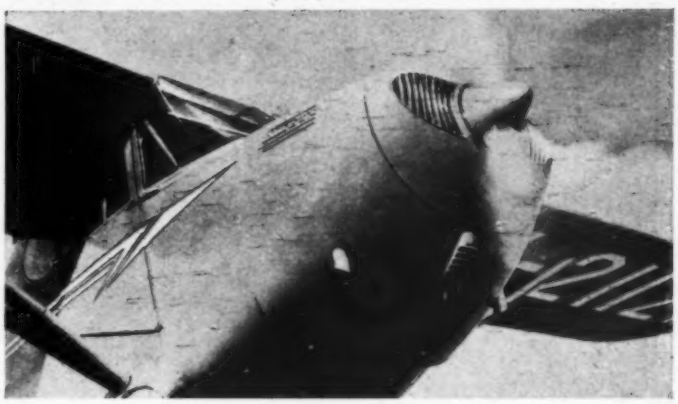
A LIGHTWEIGHT STINSON

The New "105" : A Three-seater with a 75 h.p. Engine

LAST week we gave one or two brief details of the new Stinson "105," which is intended to be considered either as a miniature and economical Reliant or as a somewhat superior example of the typical American lightweight. The idea in designing the machine has been to offer a reasonably adequate performance with a pilot and two passengers, and to provide such items as flaps and wheel brakes at not too great an initial price or running cost.

The engine is, in fact, a Continental A.75 flat-four of 75h.p., and this has been completely cowled-in, leaving only the necessary grilled apertures for pressure-cooling and intake. The cowling is quickly and easily detachable.

Structurally, the machine is conventional according to American ideas, with a wooden wing and welded steel tube fuselage, but the wing is provided with the new type of fixed "letter-box" slots along the leading edge—similar to those which are now incorporated in the Lockheed 14 wing. These slots, besides reducing wing-dropping tendencies at the stall, also give more adequate lateral control at low speeds. At the same time balanced N.A.C.A.-type flaps are fitted to the trailing edge inboard of the ailerons.



The new Stinson "105" and a close-up of the exceptionally neat pressure-type engine cowling for the 75 h.p. Continental. In general appearance the "105" may be described as a cross between the well-known Reliant and the typical American lightweight of to-day. The machine has a cruising speed of 105 m.p.h.

The pilot and first passenger are, of course, seated side-by-side in a fairly roomy cabin with wheel lateral control and dual rudder pedals. The Goodrich-Hayes hydraulic brakes are operated by the usual toe pedals, and the flap control lever has three positions. Fore and aft trim is carried out by means of a tab. There is a door on each side, and the third seat, which is evidently intended for occasional use, is of the folding type.

The wing tank carries sufficient fuel for four hours cruising at 75 per cent. power, giving the machine a still-air range of 420 miles. The standard equipment includes a battery, navigation lights and fire extinguisher, and it is being sold in this country at £995 by Brian Allen Aviation, of Hanworth Air Park, Feltham, Middlesex. No very complete performance figures are yet available, but the cruising speed will be 105 m.p.h. and the all-up weight 1,485 lb.

Inside the latest Stinson Reliant: The neatness of the instrument and control layout is noteworthy; presumably the large panel can take other instruments, such as those of the free gyro type, when these are ordered. The cowling of the latest Reliant has, incidentally, been changed both to improve the lines and to increase the accessibility.

FROM the CLUBS and SCHOOLS

(*Concluded from page 400*)

LANCASHIRE.

During the period April 6 to 13, 70 hr. were recorded in club aircraft. Mr. H. G. Watts has gone solo. The monthly hot-pot suppers will be discontinued during the summer months. Mr. C. O. Hinks has been appointed the club's C.A.G. unit leader.

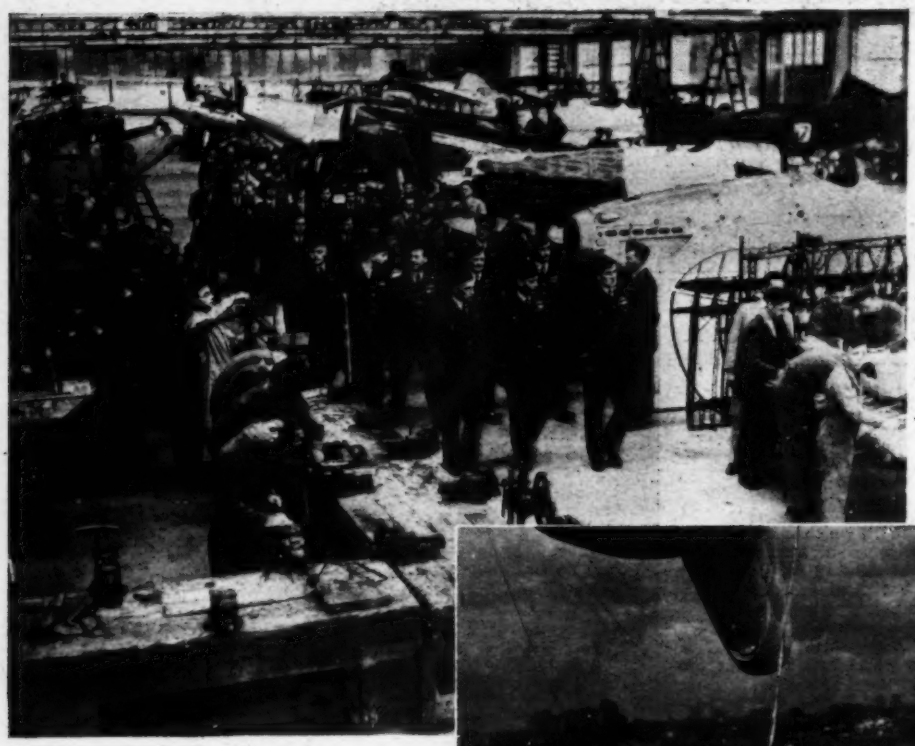
STRATHTAY.

During the first ten days of April flying time amounted to 62 hr. Messrs. A. L. Ramsay and T. V. Giacopazzi have joined as flying members. Mr. D. B. Calderwood has passed his "A" licence tests and Mr. A. A. J. Thorburn has gone solo.

NORFOLK AND NORWICH

During last week the club and C.A.G. flying at Norwich totalled 43 hr.—a fairly good figure considering that the club was closed for the holidays. Two members have completed their "A" licence tests. Not so the gliding section, however, which was very active. The annual dinner will be held to-morrow night, and Mr. Alec Henshaw's name is down to propose the toast of the club, a toast which will be responded to, as usual, by the chairman, Mr. A. A. Rice. The dinner will be held in the club lounge and dining room as on previous occasions.

SERVICE AVIATION



Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

(Above) The King in the airframe repair shop during his visit to Halton. (Right) Their Majesties the King and Queen during their visit to No. 2 Balloon Centre at Hook, Surrey, last Sunday.

The King at Halton

THE routine work at Halton, where 3,600 boys are at present undergoing training, was witnessed by the King last Friday. The King was received by Air Chief Marshal Sir Cyril Newall, who presented Air Marshal Sir Charles Burnett, Air Officer Commanding-in-Chief Training Command; Air Vice Marshal P. C. Maltby, Air Officer Commanding No. 24 (Training) Group; and Air Cdre. G. B. Dacre, Air Officer Commanding R.A.F. Station, Halton.

Apart from inspecting the shops the King visited the camp church, the laboratories and class rooms, and took luncheon at the officers' mess.

For Gallantry in Palestine

HIS MAJESTY THE KING has been graciously pleased to approve of the undermentioned rewards for gallant and distinguished service rendered in Palestine:—

Distinguished Flying Cross.—F/O. (A/Flt. Lt.) Hale Winter Bolingbroke and P/O. John Easton McFall.

Bar to the Distinguished Flying Medal.—Sgt. John Coggins, D.F.M.

On March 11 Flt.-Lt. Bolingbroke answered a call for air assistance at Zemal. Although his aircraft was subjected to heavy rifle fire from dense coverage he continued to attack the armed rebels with outstanding courage and determination. The difficulties in taking action in a deep *wadi* necessitated exceptional flying and daring. The Air Ministry states that Flt. Lt. Bolingbroke "has been in action against the enemy on numerous occasions and on many occasions has shown conspicuous gallantry and devotion to duty."

P/O. McFall was detailed on March 11 to carry out a reconnaissance for an armed band which he located approaching Zemal. He landed to report to the Officer Commanding, Trans-Jordan Frontier Force, who left in an aircraft piloted by Sgt. Coggins. When this aircraft returned with Sgt. Coggins seriously wounded, P/O. McFall answered a call for air assistance, and engaged armed rebels under heavy fire, his aircraft being hit in several places. After returning to make a further report to the O.C., he took off in another aircraft and continued to attack the enemy in co-operation with the ground forces. "He has" (says the Air Ministry) "proved to be an outstanding operational pilot and has shown high devotion to duty in face of the enemy." In October, 1938, he was brought to the notice of the General Officer Commanding, British Forces in Palestine and Trans-Jordan, for gallant and distinguished conduct in action.

When P/O. McFall's report had been received, on March 11, Sgt. Coggins piloted Lt. Col. J. I. Chrystall, M.C., Officer Commanding Trans-Jordan Frontier Force, to the scene of the action. The aircraft was continually fired at and Sgt. Coggins was very seriously wounded. He nevertheless succeeded in piloting the aircraft to the landing ground at Jisr El Mejamie, 20 minutes distant from the scene of the action, and in bringing it safely to the ground.

In July, 1938, Sgt. Coggins was brought to the notice of the General Officer Commanding, British Forces in Palestine and Trans-Jordan, for gallant and distinguished conduct in action and in November, 1938, he was awarded the Distinguished Flying Medal. His unswerving devotion to duty and disregard for personal safety have been a fine example to other pilots of his Squadron.

Imperial Equipment

AS already explained in *Flight*, batches of new high-performance military monoplanes are being delivered to Air Forces of the British Empire to acquaint pilots and maintenance personnel with their characteristics. In addition to Hurricane eight-gun fighters, South Africa has received a number of Bristol Blenheim bombers. Canada has also taken delivery of Hurricanes for fighter training. By the end of this year New Zealand will have received a large number of serviceable but obsolescent aircraft for training pilots of the augmented R.N.Z.A.F., in addition to several Vickers Wellington

SERVICE AVIATION (CONTINUED)

long-range bombers of the total order for thirty machines of this type.

It is expected that eighteen of the thirty Wellingtons will be flown out to New Zealand this year in three formations of six. Their crews will include New Zealand pilots who have graduated in the R.A.F. in this country. No record attempt is contemplated, though the flight will be a useful demonstration of the capabilities of the Wellington. The obsolescent aircraft, of which 250 will be delivered, will include Fairey Gordons, Vickers Vincents, Vickers Vildebeests and variants of the Hart, including the general-purpose Hardy

The modern equipment delivered to South Africa has been putting up some fine performances. A Hurricane piloted by Capt. R. Preller flew the 335 miles from Durban to Pretoria in 73 min., averaging 276 m.p.h. in weather conditions which hampered navigation, and a Blenheim did the Capetown-Pretoria trip (835 miles) in 3 hr. 22 min., averaging 248 m.p.h.

That Seversky

IN view of the fantastic claims made in certain quarters for the Seversky two-seater fighter which has been demonstrated to, and tested by, the R.A.F. at Martlesham Heath, it may be helpful to set out the makers' actual figures for this machine, which undoubtedly has many fine characteristics.

Known as the type 2PA Model 200, it has a span of 36ft.; is 26ft. 10in. long and has 225 sq. ft. of wing area, giving a wing loading of 26.7 lb./sq. ft. The weight empty is 4,446 lb., and the disposable load, including 130 U.S. gallons of fuel and 12 of oil, is 1,576 lb.

A Pratt and Whitney Twin Wasp fourteen-cylinder two-row engine is normally fitted, this being of the R-1830-S3C3-G type rated at 950 h.p. at 2,700 r.p.m. at 14,300ft. If required the machine can carry 200 or 480 U.S. gallons of fuel. Performance figures are: top speed, 315 m.p.h.; cruising speed, 285 m.p.h.; climb at sea level, 2,600 ft./per min.; service ceiling, 30,000ft.; range with 130 gals. fuel, 675 miles.

Siam Studies "Army Co-op."

LIEUTENANT MANOB SURIYA, of the Siamese Royal Air Force, who was attached to No. 53 (A.C.) Squadron, Odiham, for two months from March 13, has been transferred to No. 13 (A.C.) Squadron, Odiham, for the remainder of his attachment.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—

F/O. Bernard John Sciortino (flying solo) lost his life in an accident which occurred at Shoreham on April 9, 1939, to an aircraft of No. 20 Elementary and Reserve Flying Training School, Gravesend.

Sgt. George William Read (flying solo) lost his life in an accident which occurred at Plumpton, near Lewes, Sussex, on April 14, to an aircraft of No. 16 Elementary and Reserve Flying Training School, Shoreham, Sussex.

Royal Air Force Gazette

General Duties Branch

The following Flight Lieutenants are granted permanent commissions in that rank on the dates stated:—H. M. W. Thomas-Ferrand (March 3); N. D. Gilbart-Smith (March 24).

P. D. Smith is granted a short-service commission as Pilot Officer for five years on the active list (March 15).

The following are granted short-service commissions as Acting Pilot Officers on probation (March 29):—C. H. Anderson, J. Barker, A. J. G. Bisson, A. G. Boulton, G. Broad, E. H. Brown, A. W. Butler, G. A. Cockayne, R. H. A. Coombs, A. R. Costello, F. G. Daw, J. M. Dennis, P. T. Dowding, D. H. L. Farmer, R. K. Felstead, J. Goodhead, V. V. Green, C. J. Greig, V. R. G. Harcourt, P. G. Hickie, C. James, D. N. Janes, J. H. Lancaster, H. E. Large, E. F. W. McCartan-Mooney, A. J. D. Maclachlan, J. R. H. Morton, I. C. Murison, J. S. Owen, P. E. R. Pike, R. P. Priest, J. H. Reynods, J. G. Sandison, E. V. G. Scoones, R. C. Skellon, E. G. Spearing, C. S. G. Stanbury, D. W. Whiteman, R. M. Williams, G. A. Wolsey.

The following Pilot Officers on probation are confirmed in their appointments (March 27):—A. B. Mobley, J. F. Nicholson.

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers (March 7):—J. K. Bennett, E. F. Cawdery, C. G. Chappell, G. W. Cory, H. O. Forth, R. F. Gower, R. E. Hill, P. Phillips, B. J. Rofe, L. A. Scott, W. M. Sizer.

Acting Pilot Officer on probation R. J. Allanson is graded as Pilot Officer on probation with effect from October 25, 1938, and confirmed in his appointments with effect from January 9. (Substituted for notification in the *Gazette* of January 24.)

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—E. W. Martin (Acting Flight Lieutenant) (March 21) C.; Fothergill (Acting Flight Lieutenant), R. M. Fenwick-Wilson (March 24); R. E. Dupont (March 26).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—J. T. Bouwens (January 10); J. F. H. Booth (February 15); E. T. Williams (February 18); P. Folkes (March 13); J. G. McGrail (March 17); B. O. Dias, J. W. Fordham, J. W. B. Davis, B. R. Kerridge, A. McPherson, D. H. Lowe (March 24); S. C. Walch (March 26); R. Baron, E. A. Williamson, L. H. Baker (March 29); G. F. Witney (March 31); J. A. L. Fowler (April 4); E. H. Thomas (April 10).

Wing Cdr. R. A. George, M.C., is granted the acting rank of Group Captain (unpaid) on appointment as Air Attaché, Ankara (April 4).

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—R. D. Stubbs (February 11); G. M. Roddy (February 12); R. T. E. Gates, E. A. Whiteley, R. R. Holder, E. L. Hyde, H. B. Johnson, A. S. Ainslie, G. E. Ford, H. W. A. Sheahan, E. G. Jones, W. H. Biddell, A. Hibberd, J. Barrett, D. B. M. Wright, L. S. Lawrence, A. M. Jardine, F. E. R. King, H. Y. Lawrence, W. H. Cliff, P. R. Patrick, P. E. Bennett, P. G. Chapman, D. F. Spotswood, W. P. Cambridge, D. O. Butler, S. McC. Boal, L. Jobbins, R. W. Christmas, K. R. Rogers, J. R. Pennington-Legh, J. R. S. Romanes (March 2); R. P. A. Harrison (March 3)

The following Pilot Officers are granted the acting rank of Flying Officer on the dates stated:—B. J. Rogers, A. C. Leggate (November 1, 1938) H. R. MacD. Beall (November 13, 1938); F. C. Griffiths (November 14, 1938); L. P. Cattell (January 28).

The following Pilot Officers (Acting Flying Officers) are granted the acting rank of Flight Lieutenant (February 11):—H. R. MacD. Beall, F. C. Griffiths, L. P. Cattell.

P/O. L. W. Skey is granted the acting rank of Flight Lieutenant (March 2).

The following Flying Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—H. R. MacD. Beall (March 12); P. G. Chapman, H. Y. Lawrence (March 19); K. R. Rogers (March 20); L. Jobbins (March 26); J. Mercer (March 27); W. Simpson (April 9).

The following Pilot Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—F. C. Griffiths (February 18); P. S. Q. Andersen (March 27).

P/O. B. J. Rogers relinquishes the acting rank of Flying Officer (December 8, 1938) P/O.; A. G. Worcester relinquishes the acting rank of Flying Officer (January 2). (Substituted for notification in *Gazette* of March 14); P/O. R. Lloyd takes rank and precedence as if his appointment as Pilot Officer bore date March 17, 1938. Reduction to take effect from March 21; P/O. S. G. Esson takes rank and precedence as if his appointment as Pilot Officer bore date January 24. Reduction to take effect from March 21; Acting Pilot Officer on probation J. A. Donald resigns his short-service commission (April 1); the short-service commission of Acting Pilot Officer on probation P. D. Buckland is terminated on cessation of duty (April 7); the notification in the *Gazette* of March 28 concerning F/O. J. Avent is cancelled; the notification in the *Gazette* of April 4 concerning F/O. G. L. B. Hull is cancelled.

Equipment Branch

The following are granted permanent commissions as Pilot Officers on probation (April 3):—G. L. Lister, L. F. Styles.

The following are granted short-service commissions as Acting Pilot Officers on probation (April 3):—G. C. H. Ade, H. E. Barker, J. Bayliss, B. B. Booth, H. G. L. A. Brooking, F. A. Buckingham, A. A. R. Burne, J. A. Burns, H. E. C. Orde, F. J. C. Crane, J. H. Ellis, J. H. Evans, J. R. Fisher, J. H. Francis, M. R. Frazer, J. G. Geary, J. H. Griffith, P. L. Hancox, C. E. M. Hansel, E. G. F. Hill, W. O. Hill, H. J. L. Hiscocks Haig, D. A. D. Hoare, E. W. Holford, J. G. Home, J. M. Horner, T. F. H. Hudson, J. Hughes, W. D. Ingram, A. E. Jackson, N. W. Kearon, M. Keelan, F. H. Kelly, J. P. Lewin, R. E. Lewis, F. W. Lund, F. E. McDonnell, D. J. Marler, A. Mills, P. C. F. Morgan, A. G. Parry-Jones, P. G. M. Ridsdale, V. E. Robinson, R. A. Salter, K. C. R. Smith, G. N. Street, W. A. Thomas, O. R. Toyne, G. E. Tweddle, F. C. Walker, L. Webley, R. H. F. Wells, L. J. M. Wescott, J. M. White, R. D. G. White, R. Willoughby, J. W. C. Young, D. A. de S. Young-James.

F/O. J. G. B. O'Hagan is granted the acting rank of Flight Lieutenant (October 1, 1938).

Accountant Branch

W/O. R. Harris is granted a commission as Flying Officer on probation with effect from March 28 and with seniority of December 21, 1938.

The following Warrant Officers are granted commissions as Flying Officers on probation (March 27):—G. S. J. Pratt, G. E. Bryant, H. W. Kennard.

The following Flying Officers on probation are confirmed in their appointments on the dates stated:—S. R. Brown (March 21); C. H. Wood (March 28).

Chaplains Branch

The Reverend P. J. Macken, A.L.C.D., is granted a permanent commission (February 3).

SERVICE AVIATION (CONTINUED)

Commissioned Engineer Officer

Flying Officer on probation H. J. Baines is confirmed in his appointment (April 6).

Commissioned Signals Officer

Flying Officer on probation W. Wolfenden is confirmed in his appointment (March 21).

Princess Mary's Royal Air Force Nursing Service

The following Staff Nurses are promoted to the rank of Sister (March 31):—Miss R. D. Dryden, Miss U. H. Mackenzie.

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

F/O. N. V. Lindemere (R.A.F.O.) is granted a commission in Class CC as Flying Officer with the acting rank of Flight Lieutenant (February 18); Flt. Lt. D. P. McKeown is transferred from Class C to Class A (January 15); F/O. E. A. Beale is transferred from Class C to Class AA (February 14); F/O. D. H. G. Tollemache is transferred from Class C to Class A (February 15); Flt. Lt. A. L. Macmillan relinquishes his commission on completion of service and is permitted to retain his rank (March 15).

Medical Branch

Flt. Lt. V. D'A. Blackburn, M.B., Ch.B., relinquishes his commission on appointment to a commission in the Indian Medical Service (April 11).

Royal Air Force Volunteer Reserve

General Duties Branch

The following are appointed Honorary Flight Lieutenants on the dates stated:—Capt. E. O. Broadley, D.S.O. (R.N. Ret.), Capt. P. Butter (R.N. Ret.), Lt.-Cdr. S. F. W. Laidlaw (R.N. Ret.), Capt. J. C. Wauchope (R.N. Ret.) (February 23); Payr. Capt. A. B. Johnston (R.N. Ret.), Capt. M. Murray (R.N. Ret.) (February 27).

Administrative and Special Duties Branch

The following are granted commissions as Pilot Officers on probation with the honorary rank stated (April 4):—Honorary Group Captain.—A. H. Robson. Honorary Wing Commanders.—T. G. G. Hutchinson, C. W. Pollock, B. A. Smith, D. E. Williams, E. G. R. Wingham, Honorary Squadron Leaders.—B. A. Bird, A. G. Boycott, S. Brew, J. A. C. Critchley, F. B. Farthing, C. N. Heath, G. R. Keep, W. T. Matthews, J. Meadows, C. I. Morris, J. Mutch, H. W. Saunders, E. L. West, J. Whitley, G. W. Whittaker, D.S.O., H. Woffenden. Honorary Flight Lieutenants.—D. J. Addis, L. T. Agger, J. S. Bamford, W. T. Bennett, E. G. Bennison, J. W. Brown, H. F. Browne, W. A. Carmichael, F. W. Clarke, W. H. R. A. Coates, H. J. Cramp, E. S. G. Cropper, C. E. Dall, G. L. Danielson, A. E. Druett, C. L. D. Duckworth, H. G. E. Durnford, M.C., C. Ewens, R. Edwards, H. Falkner, A. F. J. Forsyth, R. W. Fowler, P. Freeman, C. G. Gilthorpe, F. D. Greeves, R. T. Griffiths, R. F. D. Hamilton, L. E. Hardstaff, T. E. J. Hewitt, T. W. K. Hider, W. H. Jones, R. A. M. Kearney, T. W. Little, H. M. McLachlan, H. H. Mayoh, L. Milner, H. Ogden, W. F. Papworth, W. N. Parry, D. M. B. Pitt, R. A. Pomeroy, R. M. Pope, F. J. M. Pryer, J. Quirk, R. J. Rackham, W. H. J. Richardson, L. M. Riley, J. W. Robertson, J. W. Sim, J. L. Smith, R. E. Stephens, R. Thomson, E. J. Tippett, C. White, H. Whittaker, T. Willcox, S. R. Williams.

Honorary Flying Officers.—S. W. Beese, P. A. Bosanquet, D. R. W. Bowman, L. K. Bradley, R. H. C. Brousson, A. H. Brown, R. H. Brown, J. B. R. Carter, C. D. Chant, K. G. Chapman, R. S. C. Cater, F. A. Coleman, P. F. Cook, I. Davies, J. Delamere, A. H. Emanuel, W. Fallowfield, J. I. Fell, H. E. Fry, K. F. Gardner, H. W. Hill, W. Hilton, W. H. Humphreys, C. J. Hunt, J. P. McAllen, J. B. McMillan, R. S. Mathieson, A. Owen, R. J. Owen, J. A. Park, C. St. Q. Playford, T. S. Preston, H. Priestley, E. Ratcliff, L. T. Rea, J. Roughley, J. S. Rowlands, E. J. Ryder, K. L. Scott, K. C. Smith, E. V. Stokes, A. B. Titmarsh, C. R. Topham, J. E. F. Voss, L. Worswick, A. Young.

The following are granted commissions as Pilot Officers on probation (April 4):—D. A. Batwell, R. H. Budworth, H. Chambers, H. R. Davies, W. L. H. Davies, C. M. Davis, E. S. Farrand, C. D. Griffiths, S. H. B. Harris, A.F.C., H. A. Hince, E. H. Irving, J. T. Knight, the Marquess of Casa Maury, T. E. Pennington, E. L. Roberts, W. N. Sherlock, E. A. Simson, A.F.C., C. A. Shute, C.M.G., C.B.E., P. Y. H. Smith, C. F. Snowden-Gamble, C. Q. Steel.

Medical Branch

J. Howkins, M.D., M.S., F.R.C.S., M.R.C.O.G., is granted a commission as Flight Lieutenant (April 11).

Auxiliary Air Force

General Duties Branch

No. 601 (COUNTY OF LONDON) SQUADRON.—The following Pilot Officers are promoted to the rank of Flying Officer (January 29):—G. R. Branch, T. E. Hubbard.

No. 605 (COUNTY OF WARWICK) SQUADRON.—C. A. Potter is granted a commission as Pilot Officer (February 20).

No. 607 (COUNTY OF DURHAM) SQUADRON.—P/O. A. O. Glover is promoted to the rank of Flying Officer (January 4).

No. 610 (COUNTY OF CHESTER) SQUADRON.—P/O. C. R. Prichard is promoted to the rank of Flying Officer (January 6).

No. 611 (WEST LANCASHIRE) SQUADRON.—P/O. J. N. O'R. Blackwood is promoted to the rank of Flying Officer (January 12).

No. 612 (COUNTY OF ABERDEEN) SQUADRON.—G. Gordon is granted a commission as Acting Pilot Officer (March 12).

No. 613 (CITY OF MANCHESTER) SQUADRON.—E. Rhodes is granted a commission as Squadron Leader and appointed to the command of the Squadron (April 11).

No. 907 (COUNTY OF MIDDLESEX) (BALLOON) SQUADRON.—E. N. Adlington is granted a commission as Pilot Officer (March 2).

No. 908 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—A.P/O. L. P. Bonnet is promoted to the rank of Flying Officer (March 1).

No. 910 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—G. N. Dawson is granted a commission as Flying Officer (March 13).

No. 913 (COUNTY OF WARWICK) (BALLOON) SQUADRON.—N. W. R. Mawle, D.F.C., is granted a commission as Flight Lieutenant (March 6).

No. 914 (COUNTY OF WARWICK) (BALLOON) SQUADRON.—The following are granted commissions in the ranks and on the dates stated:—Flight Lieutenant.—Capt. B. K. Parsons (March 6). Acting Pilot Officer.—G. A. Newenham (March 22).

No. 916 (COUNTY OF WARWICK) (BALLOON) SQUADRON.—R. C. Yates is granted a commission as Flight Lieutenant (March 6).

No. 918 (COUNTY OF DERBY) (BALLOON) SQUADRON.—The following are granted commissions in the ranks and on the dates stated:—Flying Officers.—J. Drew (March 3); Capt. A. T. Lee (March 4). Acting Pilot Officer.—G. Coppock (March 4).

Boeing Purchase Denied

MR. J. MURRAY, Washington representative of the Boeing Aircraft Company, states that no enquiries have been made on behalf of the R.A.F. concerning the Boeing B-17 four-engined bomber. A few months ago, however, British interests investigated the cost of two Boeing 307 transport monoplanes.

The Boeing concern, incidentally, will, early in May, start production of thirty-nine B-17A bombers, the Cyclone engines of which will be fitted with exhaust-driven superchargers and inter-coolers.

U.S. Fighter Crashes

THE Lockheed XP-38 twin-engined fighter which crashed at Mitchell Field after a transcontinental flight is stated to have been covered by insurance for experimental purposes, but to be beyond repair. A second machine of the type will not be built unless the company receives a new order from the U.S. Army Air Corps. The prototype had been in the air only five hours before undertaking its transcontinental flight.

A new Seversky single-seater pursuit machine, unofficially credited with a speed of about 400 m.p.h., crashed at Dayton, Ohio, on March 22.

A French "Tricycle"

OF special interest, in view of the publication in *Flight* last week of the first picture of the new North American twin-engined attack bomber, is the news that M. Mercier, who is responsible for the low-drag cowling bearing his name, has designed a fighter attack machine—the S.E.100—powered with two Gnome Rhône 14 No radials of over 1,000 h.p. each. The machine, which is nearly ready for trials, is fitted with a tricycle undercarriage, and has a welded steel fuselage and a wooden wing, though these components will be of all-metal construction on production models. The top speed should be in the neighbourhood of 370 m.p.h.

A Gull-winged Martin

THE production of the Martin 162 (U.S. Navy designation XPBM-1) twin-engined naval flying boat, a photograph of which was published in *Flight* of March 23, 1939, was facilitated, according to American reports, by the preliminary testing of a quarter-scale man-carrying flying model. The model was built and tested in 1937, and by the time the full-scale prototype had appeared, some weeks ago, the Martin technicians knew more or less what to expect from the big machine, which weighs 18 tons, has a span of 118ft., a length of 78ft., and is powered with two Pratt and Whitney Twin Hornets or Wright two-row Cyclones. In general appearance the machine resembles the Short "Knuckleduster" of some years back, having gull-type wings. The "Knuckleduster" did 150 m.p.h. with two Rolls-Royce Goshawks.

A crew of seven is carried in the Martin, at least three being assigned to the spherical gun turrets, two of which are in the side of the hull aft of the wing.

The hull is very deep and the wing floats retract inwardly. It is stated that the machine has been landed "down" a 21-m.p.h. wind without the slightest tendency to porpoise.

It is believed that flying scale models are being used in this country to pave the way for new large military types.

CORRESPONDENCE

THAT EMPIRE AIR DAY POSTER

Air Comdre. Chamier and Artists' License

WHEN the *Tailor and Cutter* reviews the Royal Academy portraits it is not interested in the virtues of a magnificent painting, but is critical of details of dress.

Perhaps it is natural for your correspondent Mr. Thetford, as an aeronautical expert, to be more concerned with the details than the effect of our Empire Air Day poster.

Posters are not photos: it is not desirable that they should advertise anything but aviation in general, and we must give artists due license.

Dare I say that this particular design was the Air Ministry's choice? And may I confess that I, last year, made the unfortunate artist alter a biplane to a monoplane and thus invited technical criticism of what was, in my opinion, a most bold and effective poster?

J. A. CHAMIER,
Secretary-General
AIR LEAGUE OF THE BRITISH EMPIRE.

London, W.C.2.

An Artist's View

YOUR correspondents' criticism of the poster in your issue of April 6 certainly *was* hypercritical. To call it an "unauthentic" painting was going much too far. Call it "an error of detail" if you like.

Whether Mr. O. G. Thetford was an unsuccessful candidate in the competition, I do not know. If he was, he has my sympathy; but I consider his "mud-slinging"—also at aeronautical artists—very bad taste.

Nevertheless, I am rather surprised that an artist who can execute such a striking and attractive poster should not have paid a little more attention to detail, although in the rush to get finished in time for submission, a small yet glaring error may easily be overlooked.

The only criticism I can make is, probably, one that few might think of, but not a hypercritical one, I trust. That is, by showing only one type of aircraft a free advertisement is given to the makers of that particular make of aircraft and engine, which, had I entered the competition myself, I should have been fearful of doing. This, in my opinion, is somewhat unfair to all the other successful aircraft and engine manufacturers.

AERONAUTICAL ARTIST.

Cambridge.

SERVICE AT LYMPNE

The Airport Staff Defended

From Sir Ralph Hare, Bt.

HAVING read the letter in your issue of April 6 headed, "Those Landing Fees" and signed by Mr. Foster, of Eastbourne, I feel that I cannot allow his statements in connection with the actions of the officials at Lympne to go unanswered.

I have visited certain parts of the Continent by air pretty frequently in the course of the last two or three years. As I live in the Eastern Counties, I naturally find it quicker and more convenient to use Lympne for clearing Customs, etc., rather than to proceed to a London airport. It has therefore become a habit of mine to undergo the usual formalities at Lympne before once more hurling myself into space and proceeding like an infuriated wasp across the water.

I must admit that, on the first occasion, I was a bit frightened by the various forms which I was asked to sign. Thanks to the extreme kindness and helpfulness of the officials, however, the forms and payments were quickly completed and I was free to proceed abroad. From that date I have always regarded the officials at Lympne as being personal friends, not only to me, but also to all travellers passing through. Never once have they failed to help me, although I am afraid that I have caused them a lot of work.

Let the writer of the article pause to think before he launches a further violent attack upon the good men of Lympne. He would surely be less critical if he were to find himself in an awkward and extremely damp position in mid-Channel. This might be an uncomfortable proof that the officials are, after all extremely efficient at their job, for it is due to them that successful rescues are made. The landing fees and the forms may seen a bit tiresome when one is in a hurry, but the officials are not responsible for their invention and, after all is said and done, it is, in fact, their duty to see that all rules are complied with.

In my humble experience I have never had to ask an official at Lympne to turn a propeller, for the very good reason that they have always offered to do so and I cannot therefore believe that, had the writer of the article asked very nicely, he would have been refused the help which he required.

RALPH L. HARE.

King's Lynn.

Air Comdre. Chamier with the poster which forms the subject of the controversy on this page.

C.A.G. TRAINEES

A School's Claim to Sixth Place

ON page 350 of the April 6 issue of *Flight* you give some C.A.G. figures quoted by Sir Lindsay Everard.

Sir Lindsay Everard is our Home Commissioner and we are sure that, except inadvertently, he would not have missed out the Bedford School of Flying, which, irrespective of licences renewed, has actually trained and obtained 28 "A" licences.

This brings the Bedford School of Flying about sixth in the list. We take this opportunity of saying that this Club trains on standard machines.

We would like it to be primarily understood that, although we bring this information as to the number of pilots trained to your notice, we have not, and shall not ever engage in any competition to obtain the maximum number of licences in any particular length of time.

From your knowledge of our aerodrome you will know that the majority of pupils who have obtained their licences on the normal municipal aerodromes would never be able to bring a machine into Barton.

In addition to the flying training, almost every evening of the week there is a lecture in connection with elementary and advanced navigation, aero engines and aircraft. Every day of the week there is instruction in practical training in full swing.

For BEDFORD SCHOOL OF FLYING, LTD.,
D. M. K. MARENDAZ,
General Manager.

Barton, Beds.

FLIGHT NEXT WEEK: COMMERCIAL AIRCRAFT AND AIRLINES NUMBER

THE ROYAL AERO CLUB

News and Official Notices for the Week Ended April 15

Bridging the Centuries

PRIVATE aeroplanes will play the chief part in an historic ceremony which is to take place at Angers, in France, on Saturday, July 23. It is the inauguration of the monument to the Plantagenet Kings of England, whose tombs are in the Abbey of Fontevrault, and it is the culminating item in the entirely novel programme which has been arranged by the Aero Club de l'Ouest de la France, under the title of "Rallye Plantagenet." The aeroplanes taking part will thus provide a link with the 12th century, when the fields of France were often the stage of scenes of colour and pageantry. Modern chivalry will be represented by members of the Saumur Military School, leading centre for training in horsemanship, where a banquet and military fête will take place on July 24.

Invitations are now issued by the Aero Club de l'Ouest through the Royal Aero Club, and they cover July 22, 23, 24 and 25. Two cups are offered for competition, one by Millicent, Duchess of Sutherland, who lives in an Anjou chateau, and the other by the Aero Club de l'Ouest.

Dinners, visits to the vineyards and garden parties will make up the rest of the programme, and an additional attraction will be a souvenir to be offered by the French Club to English aviators consisting of samples of the world-famous local wines and liqueurs.

Deauville, 1939

ESSENTIALLY modern will be another event to be held in France on July 14-16—the famous Deauville Week-end Air Rally. Invitations are limited to the pilot and one passenger, and those accepting will be guests of the Aero Club of Deauville. They will be given hotel accommodation, meals and free admission to the casino, golf course and tennis courts.

Last year this was one of the most popular events of the year, and The Committee of the Royal Aero Club, interpreting the feeling of the members that some return should be made for this hospitality, has decided to make a charge of one guinea per person to cover organisation expenses and a cocktail party at Deauville.

Full details of the programme and also of the regulations for the "Rallye Plantagenet," which is mentioned above, will be announced later in these notes. Private air tourists wishing to take part in these events should send in their names immediately to the Secretary of the Royal Aero Club.

Other Events

MANY other important events among the aviation fixtures for the present year make the list one of the most interesting yet issued. It includes a total of 30 different competitions and meetings, and is being sent out to all Royal Aero Club members and to the Light Aeroplane Clubs affiliated to the Royal Aero Club. It will also be sent to other people on special request. The first on the list is the Royal Aeronautical Garden Party at Heathrow Aerodrome, Hayes, on May 14. Empire Air Day is May 20, and the National Gliding Contests at Great Hucklow, Derbyshire, on July 8 to 16. The Coupe Deutsch de la Meurthe will be held at Etampes by the French Aero Club on October 1, and the annual Fédération Aéronautique Internationale Conference will be at Athens in September. Two balloon contests are included in the list this year, one at Zurich on May 14 under the auspices of the Swiss Aero Club, and the other, the Gordon Bennett Balloon Race, in Poland, on September 3.

September 2 has been definitely decided upon as the date of the King's Cup Air Race and the Wakefield Challenge Trophy Race, to be flown from Birmingham Airport.

On the Air Routes

BELGIUM.—*Brussels Aerodrome.*—Owing to continuous rainfall the surface of the above aerodrome is in very bad condition and pilots are recommended to exercise caution. Repair work is in progress. The aerodrome is closed at night.

FRANCE.—*Amiens Glisy Aerodrome* has been opened for public use. Its co-ordinates are 49° 52′ N., 02° 28′ E.

HOLLAND.—Attention is drawn to the fact that grass-cutting at aerodromes in Holland is either already in progress or will commence shortly.

Leeuwarden Aerodrome.—As from April 1 this aerodrome, which was closed last December, became available for use by public air traffic. The landing area has been enlarged and is now 800 x 800 metres. A strip 100 metres wide on the east side of the landing area is temporarily closed to traffic.

Aviators' Certificates

No.	Name	Club or School	Date
17,565	Alfred Herbert Warminger ...	Norfolk and Norwich Aero Club.	1.4.39
17,566	Alan Herbert Wilson	Coventry Aeroplane Club	1.4.39
17,567	Leonard Henry Meeson	Coventry Aeroplane Club	5.4.39
17,568	Frederick Arthur George	Wiltshire Flying Club ...	7.4.39
17,569	George Palmer	Wiltshire Flying Club ...	13.3.39
17,570	Edward George Onslow	Romford Flying Club ...	8.4.39
17,571	Tom Roy Jenkins	Bristol and Wessex Aeroplane Club.	5.4.39
17,572	Frank Roye Walpole Palmer ...	Norfolk and Norwich Aero Club.	8.4.39
17,573	Frederic Alfred Ling	Norfolk and Norwich Aero Club.	9.4.39
17,574	Charles Lovell Wallace Mason ...	Isle of Wight Flying Club	2.4.39
17,575	John James Robinson	Border Flying Club ...	6.4.39
17,576	Reginald Tupper Carnegie ...	Border Flying Club ...	6.4.39
17,577	Reginald Robert Barber	Malling Aero Club ...	8.4.39
17,578	Gordon Janner Burgess	Malling Aero Club ...	8.4.39
17,579	Frank Charles Lewis	Leicestershire Aero Club...	6.4.39
17,580	Ronald Sydney Polley	Romford Flying Club ...	7.4.39
17,581	Richard Robson Corker	Newcastle Aero Club ...	5.4.39
17,582	Wilfred Stanley Townsend Carter	Romford Flying Club ...	3.4.39
17,583	John Lyall	County Flying Club ...	5.4.39
17,584	Robert George Murray Whigham	Airwork Flying Club ...	4.4.39
17,585	Thomas Wewege-Smith	Airwork Flying Club ...	2.4.39
17,586	Arthur Richard Warwick Jordan	Bedford Aero Club ...	7.4.39
17,587	Patrick Clement Geary	Herts and Essex Aero Club	9.4.39
17,588	Edward Gordon Heath	Herts and Essex Aero Club	6.4.39
17,589	Brian Croft...	Redhill Flying Club ...	31.3.39
17,590	Richard Edward Wellband ...	Cambridge Aero Club ...	6.4.39
17,591	Roma Mollie Roper	Cambridge Aero Club ...	2.4.39
17,592	Herbert Standen	Cambridge Aero Club ...	10.3.39
17,593	Jack Keith Moss	Cambridge Aero Club ...	3.4.39
17,594	Antony Norman Whiteside ...	Cambridge Aero Club ...	18.3.39
17,595	Edward Cecil Anderson	Cambridge Aero Club ...	12.3.39
17,596	Edwin Alfred Dickenson	Cambridge Aero Club ...	1.4.39
17,597	James Michael Heigham Royce Tomkin.	University Aero Club ...	20.3.39
17,598	Robert Templeman Cole	University Aero Club ...	10.2.39
17,599	Ronald Thomas Kidman	University Aero Club ...	12.3.39
17,600	Godfrey George William Pledger	University Aero Club ...	27.3.39
17,601	Harry Sydney Gordon Viner ...	Eastbourne Flying Club...	31.3.39
17,602	Harold Frank Webster	Romford Flying Club ...	9.4.39
17,603	Frank Albert Manning	Insurance Flying Club ...	24.3.39
17,604	Richard Samuel Keith Hickmott	Malling Aero Club ...	31.3.39
17,605	Edward Francis Harold Cosh ...	Malling Aero Club ...	10.4.39
17,606	John Porteous Russell Galbraith	Edinburgh Flying Club ...	8.4.39
17,607	William Darbyshire	Coventry Aeroplane Club	11.4.39
17,608	Ralph Newton Stevenson	Coventry Aeroplane Club	7.4.39
17,609	William Walter Fossett	Southend Flying Club ...	11.4.39
17,610	Percy Francis Winter	Southend Flying Club ...	11.4.39
17,611	Muriel Phyllis Horrox	Yapton Aero Club ...	9.4.39
17,612	Charles Ernest Bishop	Yapton Aero Club ...	7.4.39
17,613	Frederick Wooldridge Lister ...	Hampshire Aeroplane Club	4.4.39
17,614	John Urbane Gale...	Hampshire Aeroplane Club	7.4.39
17,615	Peter Henry Lillywhite	Portsmouth Aero Club ...	8.4.39
17,616	Charles William Hawkes	Portsmouth Aero Club ...	9.4.39
17,617	John William Clarence Payne ...	Portsmouth Aero Club ...	8.4.39
17,618	Joseph Kitching	York and Leeming Flying Club.	9.4.39
17,619	George Arthur Theyer	York and Leeming Flying Club	11.4.39
17,620	Elliot John Duncan Ettwell ...	Airwork Flying Club ...	8.4.39
17,621	Charles Kirwan FitzGerald ...	Airwork Flying Club ...	8.4.39
17,622	Washington Henry Samuel Ansell	Herts and Essex Aero Club	6.4.39
17,623	Douglas Rylaud Vickers	Cinque Ports Flying Club	8.4.39
17,624	Thomas Hugh Nichols	Midland Bank Flying Club	8.4.39
17,625	John Alfred Walter Brailsford ...	County Flying Club ...	6.4.39
17,626	John Freeguard	Cardiff Aeroplane Club ...	10.4.39
17,627	Ronald William Bouts	Herts and Essex Aero Club	30.3.39
17,628	Donald William Cameron	Sheffield Aero Club ...	9.4.39
17,629	Robert Boyd Clavery	Newcastle Aero Club ...	5.4.39
17,630	Edward Kendrick Lee	Tollerton Aero Club ...	1.4.39
17,631	Thomas Vincent Neville Dearden	Tollerton Aero Club ...	6.4.39
17,632	John Miller...	Tollerton Aero Club ...	6.4.39
17,633	George Vesey Dungey	Plymouth and Dist. Aero Club.	11.4.39
17,634	Robert Ernest Knowler Pembrook	Kent Flying Club ...	10.4.39
17,635	Shirley Alfred Chichele Beechey...	Kent Flying Club ...	2.4.39
17,636	John Richard Francis Daw ...	Exeter Aero Club ...	2.4.39
17,637	Henry Michael Andrew Armstrong	Exeter Aero Club ...	11.4.39
17,638	John Campbell	Hampshire Aeroplane Club	11.4.39
17,639	Fred Morrell	Midland Aero Club ...	6.4.39
17,640	Malcolm Noel Anderson	Midland Aero Club ...	6.4.39
17,641	Ernest Kirby	York and Leeming Flying Club.	11.4.39
17,642	Thomas George Marshall	Yorkshire Aeroplane Club	10.4.39
17,643	Roland Chapman	Yorkshire Aeroplane Club	9.4.39
17,644	Leonard Samuel Thorrowgood ...	Yapton Aero Club ...	9.4.39
17,645	Eric Hustwayte	Romford Flying Club ...	2.4.39
17,646	Hugh McLennan Kendall ...	Bedford Aero Club ...	11.4.39
17,647	William John Barnfather... ...	Border Flying Club ...	11.4.39
17,648	Harold Seppings	London Transport (C.B.) Sports Assn. Flying Club	7.4.39
17,649	Leon Rowe Blewett	Redhill Flying Club ...	2.4.39
17,650	Richard Martin Sydney Sedgwick	Barnstaple and North Devon Flying Club.	8.4.39
17,651	Ian Hugh Macalister Gunn ...	London Air Park Flying Club.	8.4.39
17,652	David Mitchell	London Air Park Flying Club.	8.4.39
17,653	Janet Marion Gordon-Luhrs ...	London Air Park Flying Club.	8.4.39

TOPICS of the DAY

By "Indicator"

Helping Themselves

WHILE the Air Ministry is now trying to encourage the development of internal airlines with a somewhat meagre subsidy and with the incidental work of the Air Transport Licensing Authority, it becomes especially difficult to see why the Government does not try to help both the operators and itself still more. It seems to me that this could be done so very easily.

The A.T.L.A. has sorted out different routes, reduced unnecessary competition, and, more important, has enabled the various companies to get together and given them a chance to co-operate in such a way that before next year we should see a much more rational airline system. Out of this, and the generally more helpful official attitude towards civil aviation as a whole, it has also been possible to produce faster and more efficient aeroplanes for subsidised operation both here and abroad.

At the moment the subsidy for the internal airlines is only 6d. per ton-mile capacity—which works out over all the services to about £50,000—which is only half the £100,000 promised. This subsidy will just about pay each company's fuel tax, so that what it amounts to is that the Government is taking £50,000 out of one pocket, putting it in another, and retaining the odd £50,000 for its own uses.

If the internal airline companies are to have assistance, what is there against the idea of doing it properly and asking for some useful service in return? In other words, to subsidise them to an extent which would enable each to buy and run really advanced types and then to stipulate that these types should be specially modified to make them valuable for certain military duties. The Hudson is, after all, only a modified version of a civil machine—the Lockheed Fourteen.

There is no reason why a machine such as the D.H.95 might not do equally as well in a similar or other capacity. No passenger would notice that the fuselage had been altered to take, for instance, a rear gun turret when necessary, or that the nose had been changed in order to accommodate a bomb aimer.

Additionally, and with really useful modern equipment, the various internal airline runs could provide a fine training ground for Service pilots in civil methods of navigation. Some time ago it was arranged that such pilots should travel as supernumerary first officers with Imperial Airways and British Airways on the various Continental services, and the experience of flying over the internal routes would be equally useful—though only three civil aerodromes in this country at present have ultra-short-wave blind approach equipment, which, with celestial navigation, forms one of the corner stones in Service navigational development.

Single-track Thinking

INCIDENTALLY, although I am convinced that the present Service passion for sextants, coupled with blind-approach systems, is a very good thing indeed, I do not feel at all certain that it is safe to depend entirely on such combined aids. Recently, for instance, there have been days when cloud formations extended from a thousand feet up to ten thousand feet—with ice-forming conditions existing more or less from the base to the top.

In such circumstances it would not be possible for even a lightly loaded bomber to climb up through what the Americans call the overcast to obtain sextant sights. The pilot would then depend on pure dead-reckoning to bring his machine within range of a particular ultra-high-frequency transmitter. In fact, there might be plenty of occasions on which the only possible means of getting home would be with the help of medium- or short-wave direction-finding facilities—whether on the ground or on the machine itself.

To state categorically that D/F will be no good in war conditions seems to me to be nonsense. Apart from the fact that it would not be possible for any foreign station to jam all possible wavelengths, there is no reason at all, in the present state of knowledge, why medium-short waves should not be used for this purpose. And it is, I believe, impossible to override high-frequency transmission outside a range of a couple of hundred miles or less.

Furthermore, the frequencies used could be changed daily or even hourly. The short-wave two-way set which is at present used in fighting aircraft has a series of spot-controlled frequencies which are modified according to the circumstances, and the pilot merely knows that he must transmit on No. 2 or receive on No. 4—or whatever the day's figures in the selector quadrant may be. He himself does not even know what the frequency is.

I notice that some of the very latest bombers have loop aerials, and that the Airspeed Oxford twin-engined trainer has D/F equipment—so maybe I'm speaking out of turn. Nevertheless, I know what the experts in the Air Ministry have to say—and they are all convinced that D/F will be a waste of time in war. The Germans do not think so.

"Built-in" Safety

OVER here the number of accidents to private owners and amateur pilots in general is so comparatively small that, so far, no very special effort has been made to encourage manufacturers to produce what are so inaptly known as fool-proof aeroplanes. In the United States, however, where there is a vastly greater number of privately

SOLITUDE: This photograph was taken by Capt. A. S. Wilcockson, of Imperial Airways, at 11,000ft. over the Atlantic during one of *Caledonia's* experimental flights along the Foynes-Botwood route in 1937.

Topics of the Day

owned machines—most of them in the ultra-light class—the quite extraordinary number of 690 fatal accidents occurred during the four-year period between 1934 and 1938. Of this number, which is covered in the statistics under the rather general heading of "non-scheduled flying," 466 were caused by accidental stalls and/or spins.

In the circumstances, it is not very surprising that the new Civil Aeronautics Authority is thinking of ways and means by which "built-in" safety can be encouraged in the case of types designed especially for the private owner or the pupil. As the chairman of the Authority explained in an address earlier this year, the C.A.A. does not intend to penalise the struggling aircraft industry (which always appears to "struggle" in every country, though astronomical sums are spent every year in the manufacture of military aircraft), but rather to offer a premium in the form of easier regulations if and when any manufacturer has the initiative to produce a type with safer performance characteristics.

He suggested that one way in which this premium might be offered would be to halve, or, at least, reduce to a substantial degree, the amount of dual and solo flying-time now required by American regulations for a private pilot's licence. Since this would automatically reduce the expense of learning to fly no manufacturer would need to worry about the possible market for a suitable safety-first machine.

Two months ago, in fact, the C.A.A. placed a memorandum covering the suggested points for new airworthiness requirements before three American light aircraft manufacturers. These requirements were pretty stringent, demanding that machines should be capable of being landed easily at any speed between the minimum and twice the minimum speed, and should remain on the ground after contact, with or without full application of brakes—obviously involving a tricycle undercarriage; should be capable of being landed over a fifty-foot obstacle and brought to a stop within a horizontal distance of 500ft.; should be capable of landing with a vertical velocity component of 15ft./sec.; and be capable of being brought in with the elevator control fully back. Additionally, again with the stick right back and with aft loading, the lateral stability should be such as to prevent a wing from dropping, while the machine should be fully controllable laterally during this process—spin-proof, in fact. Other points were that only two main flying controls should be fitted, both operated from the same control wheel or column, and that the field of view both in the air and on the ground should be beyond reproach. The millennium may yet arrive.

Incidentally, the C.A.A. Air Safety Board proposes, during this year, to publish not only individual accident reports, but also group studies showing the trends and tendencies in these accidents. Over here it is very rarely that a full report is ever offered, and, even when it is, those people who are interested must sometimes wait anything up to eight months before reading it. By that time work on new prototypes may have been started, these prototypes possibly embodying the very features which have caused previous accidents. It is hardly to be expected that the Air Ministry would or could publish details of the findings in the case of Service accidents, but at least we should be able to expect full and more or less immediate reports on all accidents, whether fatal or otherwise, which have occurred to civil machines.

INDICATOR.

Control at Renfrew

SINCE April 5 the Air Ministry has been responsible for air traffic control at Renfrew, the airport of Glasgow, and one of the Heston staff is now in charge there. This is the tenth aerodrome at which control responsibility has been taken over by the Air Ministry.

Another I.O.M. Change

A FEW weeks ago we mentioned that the Whit-Saturday Isle of Man air race route would be changed in that the previous compulsory stop of one hour at Speke, Liverpool, would be dispensed with. Now, it appears, the organisers have decided to shorten the course and to increase the length of the sea crossing by making Blackpool the jumping-off point, in place of St. Bees Head, which had to be rounded in previous years. As in the case of last year's race, the starting point will be at Hatfield, the competitors flying straight to Blackpool and then across to Douglas—a total distance of 256 miles.

A Hanworth Year

AT the annual general meeting of the London Air Park Flying Club on April 5, the chairman, Mr. James Rush, explained the strain which the C.A.G. had put on the club as a whole and on the individual members of the committee. Late last year the club was taken over by the Blackburn Company, who had made it clear that they desired to re-establish the club's standing from the ordinary members' point of view.

Since the inception of the Civil Air Guard scheme sixty-one "A" licences had been obtained—which is a record for all the clubs in the country—and since September 20 more than 2,100 flying hours had been put in. The L.A.P.F.C. was the first club in the country to install a Link Trainer, on which certain experimental work had been carried out for the benefit of the Air Ministry. At the moment the club's fleet consisted of twelve Swallows and six Aeroncas, a definite proportion of which would, in future, be allocated to private members for whom the solo rate had been reduced to thirty shillings an hour in the case of the Swallow.

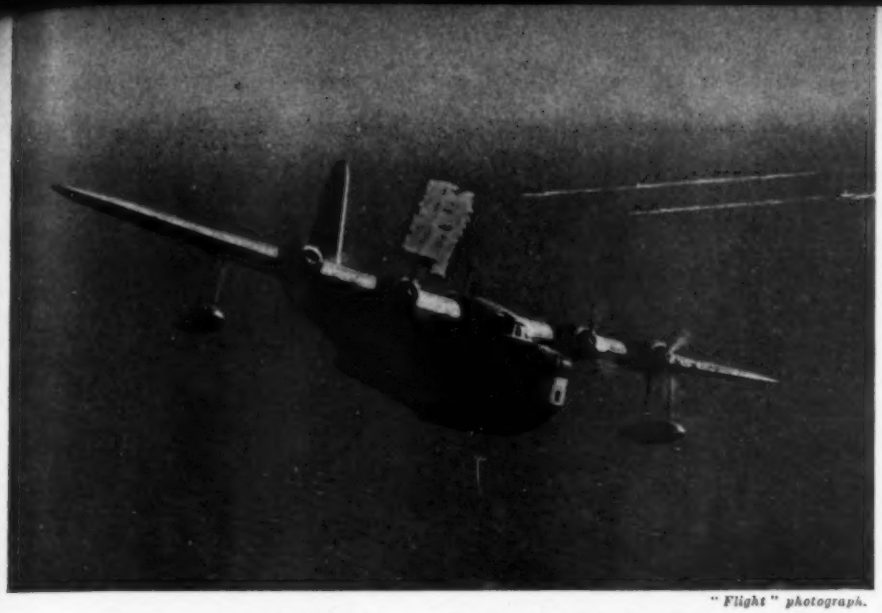
And Now—a Little Bellanca

THE American civil aircraft industry appears to have decided once and for all that there is a very useful market for private aeroplanes, provided that these are sold at a reasonable price and do not cost too much to operate. One of the latest additions to the medium-small class is the Bellanca Junior, which is normally powered either with a Le Blond 5E (70 h.p.) or a Le Blond 5F (90 h.p.).

This new machine is a low-wing cantilever monoplane bearing a certain superficial resemblance to the larger Spartan Executive. It can be bought with a retractable undercarriage and has been designed throughout to permit quantity production at low cost. The wing is of wood, with the familiar Bellanca B type of section with angular wing tips. The fuselage is of welded steel-tube construction and the cabin accommodates three people, two in front and one behind. The retractable undercarriage, which is mechanically operated by means of a crank accessible from either of the front seats, is actually an item of additional equipment, and the Junior can also be obtained with a fixed undercarriage.

The more important figures for the 90 h.p. model with retractable undercarriage are as follows: Span, 34ft. 2in.; length, 21ft. 3in.; weight empty, 943 lb.; all-up weight 1,650 lb.; maximum speed, 135 m.p.h.; cruising speed (75 per cent. power), 120 m.p.h.; landing speed, 45 m.p.h.; rate of climb, 800 ft./min.; cruising range, 500 miles.

The new Bellanca Junior in its retractable undercarriage form. It has the familiar Bellanca wing shape and section.



" *Flight* " *photograph.*

Shorts To-day : The Sunderland, with four Bristol Pegasus XXII engines of 850 h.p. each, a span of 112ft. 9in. and a normal weight of 44,460 lb.

Birth and Growth of a famous British Aircraft Firm : The History of Short Brothers

THIRTY SHORT YEARS

"LOOK here, Eustace, this thing is going to knock ballooning into a cocked hat, and we have got to do something about it."

That was how the great firm of Short Brothers came to be founded. The year was 1908, the place was Battersea, and the persons concerned were Oswald and Eustace Short. They had, for several years, been makers of balloons, and Eustace had himself done a great deal of ballooning, but up till then they had not entertained the idea of turning their attention to heavier-than-air flying machines. Oswald Short had been reading accounts in the papers of flights by the Wright brothers in America, and with that foresight which has characterised all his work ever since, he saw that the aeroplane, with its speed and its independence of winds and weather, had possibilities of development not shared by the balloon.

" *Flight* " *photograph.*

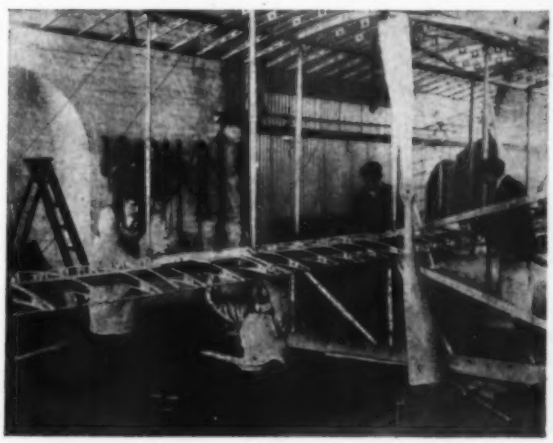
Mr. H. O. Short.

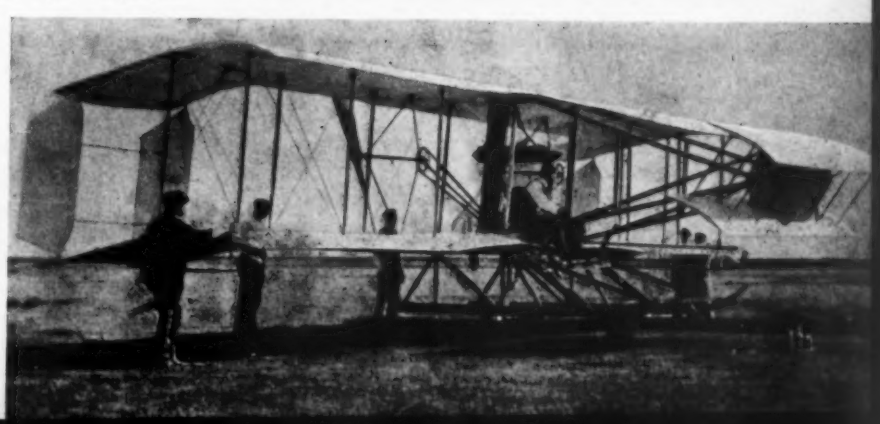
Oswald and Eustace talked the matter over, and came to the conclusion that they had not sufficient technical knowledge to embark upon a venture so complicated as the design and construction of aeroplanes; but their elder brother, Horace, was an engineer, and if they could get him interested they felt it might be possible to make a start.

But Horace was in Newcastle, where he was doing experimental work for the Hon. C. A. Parsons, and there was no telling how he would take such a suggestion. There was only one way to find out: Oswald took the first available train to Newcastle, where he put the proposition up to Horace. His reply was startling, but typical of the man. "I will come in with you," he said, "and I will give you three days. If by that time you have not made up your mind I will start without you." That he had an agreement with Parsons was a minor consideration. History does not relate how he got around the agreement, but very probably Parsons realised, knowing Horace Short as he did, that it would be futile to try to keep him against his will, and he most likely released him from the contract.

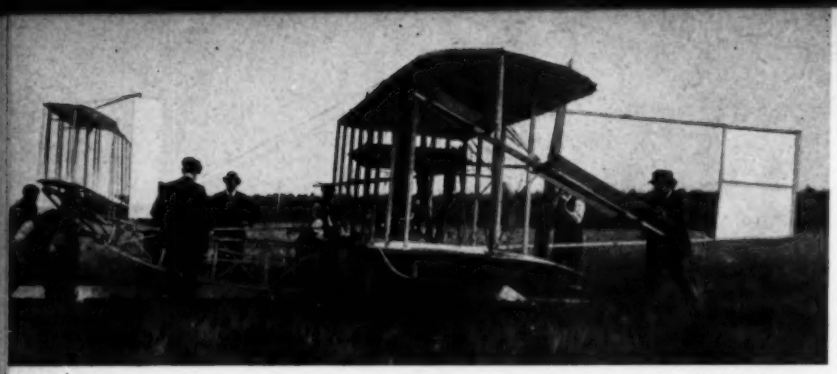
Within a very short time the works at Battersea (they were actually railway arches) were beginning the manufacture of components for the first Short biplane. One of our pictures shows workers assembling this machine. It was a biplane with elevators in front and rudders at the rear, and bore a faint resemblance to the Wright biplanes, although it differed from them in a great many respects. The first machine was built for Mr. Frank (now Lt. Col. Sir Francis) McClean, who was one of the founders of the Royal Aero Club, and to whose generosity early British aviation owes more than it can ever repay.

The first machine, Short No. 1, was originally fitted with a car engine, as no British aero engine was available,



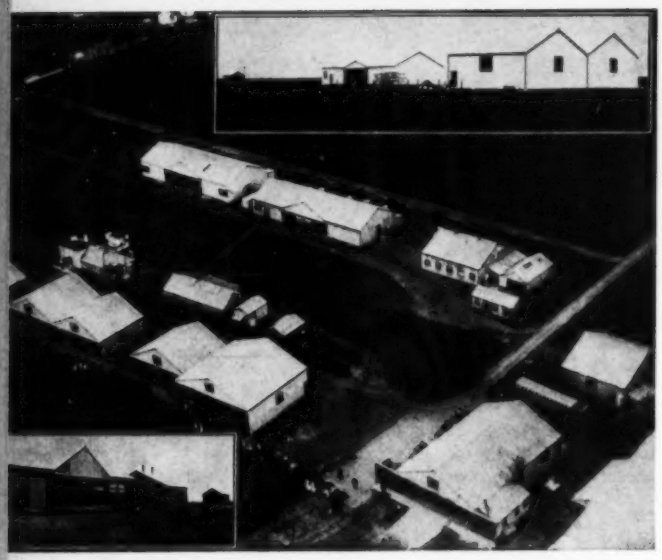


Shorts in the beginning : Their first machine, a biplane, had a front elevator and wing-tip rudders. It never actually left the ground. The other view shows the machine, "Short No. 1," being built under railway arches at Battersea in 1908.



"Short No. 2" resembled No. 1, but the rudder was carried on outriggers and not on the wing tips. Note the unusual lateral controllers. On this machine Lt. Col. Moore-Brabazon flew a mile in a closed circuit.

"Flight" photograph.



Eastchurch from the air in 1910. The upper inset shows the sheds at Leysdown and the lower the beginnings of the Short works at Eastchurch

and it is almost superfluous to say that the machine never got off the ground, the engine being too heavy. But it had taught Short Brothers quite a lot, and they at once set to work on No. 2.

In the meantime, it was no good building aeroplanes unless one had a place to fly them and—what was equally important in those days—a shop where they could be repaired and modified, a process which was usually necessary after every flight! The choice of Shorts fell on Shellbeach, Isle of Sheppey, where they built their first sheds on the aerodrome in 1909. Shortly afterwards the Aero Club also established headquarters there, at "Mussel Manor," largely through the generosity of Frank McClean, who was thus able to combine club life with flying.

Short No. 2, which was built to the order of Mr. (now Lt. Col.) J. T. C. Moore-Brabazon, was erected at Leysdown, and "Moore-Brab" began to make hops there in July and August, 1909. The machine had some rather quaint control surfaces for maintaining lateral balance. They are shown in one of our photographs. History does not relate how effective these controls were, but at any rate Moore-Brabazon had, by October, 1909, sufficient control of his machine to win the *Daily Mail* prize of £1,000 for the first flight of one mile in a closed circuit. The flight took place at Shellbeach. The engine with which this machine was fitted was very powerful for those days: it was a Green water-cooled in-line, and developed 50-60 b.h.p. for a weight of 250 lb.! The two airscrews were driven by chains, one of which was crossed so as to make the two rotate in opposite directions.

It was while work was beginning at Leysdown that Shorts took on Mr. P. M. Jones as draughtsman. The event may seem fairly trivial until one remembers that at that time there were no aeronautical draughtsmen, and that thus Mr. Jones probably holds the unique distinction of being Britain's first, certainly to be taken on by a firm which was out for serious business and not merely for experimenting. Mr. Jones, it might be mentioned, is still with the firm and has been there all the time, except for a short interval, after the death of C. S. Rolls, when work closed down for a time.

A "Production" Order

The next important event in the history of Shorts came when orders were placed for six Wright biplanes. This was the first real production order for aeroplanes ever placed in Great Britain, and resulted in firmly establishing Shorts as aeronautical engineers. The details are told elsewhere in this issue by that veteran friend of the Wright brothers, Griffith Brewer, in some reminiscences of the early days. Mr. Brewer introduced the Wright brothers to this country, was one of their very first passengers, and still flies his own aeroplane at 72, a fact which is not generally known.

Leysdown was by now becoming too small for the ever-growing business being done, and in 1910 the works were transferred to Eastchurch, although Oswald Short, who was a bachelor, continued to live at Mussel Manor, Shellbeach, the Aero Club's clubhouse. At Eastchurch many experimental aeroplanes were built during the next four years, until in its turn Eastchurch became too small and too remote, and the works were transferred to Rochester.

After completing the orders for Wright biplanes, Shorts once more reverted to original design. The first was a biplane of the pusher type resembling the Henry Farmans

This unique historic group is from Mr. Oswald Short's collection. The gentleman on the left was the owner of "Mussel Manor," at Shellbeach. Then follow, from left to right, Oswald, Horace and Eustace Short, Frank McClean, Griffith Brewer, Hedges Butler, Dr. Lockyer, and Warwick Wright. Seated, from left to right, are Moore-Brabazon, Wilbur Wright, Orville Wright, and C. S. Rolls.

The Short S.38 showed Farman influence, but differed in having a nacelle and a front elevator. The engine was a Gnome rotary. In this picture Oswald Short is in the pilot's seat and Eustace is the passenger.

of the period but with many detail differences. By a process of development this "box kite" type of Short was refined and improved, until it was quite a strong flier. Characteristic features were the nacelle, which protected the pilot from draught, and the small front elevator. It is, perhaps, doubtful whether this elevator added much to the power of the rear elevator, but it formed a useful datum line for the pilot if it did nothing else. Frank McClean bought several versions of this particular type of machine, and had some of them fitted with floats. On one he flew under Tower Bridge, and another he took to Egypt, where he did a lot of flying above the Nile.

Horace Short was ever a great believer in engine power. At a time when most other designers were rather frightened of very powerful engines he was looking around for all the power he could get, realising that in a good power reserve lay the greatest safety. The present Editor of *Flight* remembers discussing this question with him in 1911 or 1912, and the very convincing arguments Horace used in making out his case for power and still more power. "There is," he said, "no limit to what an aeroplane can do if you give it enough power." At that time he had found one solution of the problem, although many years were to elapse before the real solution was found.

The Short "Double Twin" of 1911 had two rotary engines, with the pilot placed between them.

First Twin-engined Aeroplane

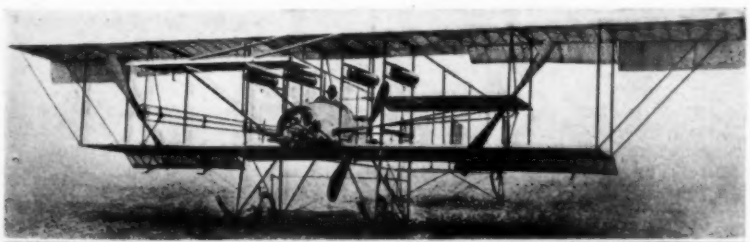
Briefly, Horace Short argued that if he could not get single power plants of the required output, he must use more than one engine. One machine, again built for Frank McClean, became known as the "tandem twin." It had two Gnome rotary engines, one driving a tractor and one a pusher airscrew. The pilot sat between the two. Yet another variation on the same theme was built in 1911 and became known as the "triple twin." These were almost certainly the first twin-engined aeroplanes in the world. In 1912 a monoplane with two 70 h.p. Gnome engines in tandem was built for the Navy. Its nickname (probably justified) was the "Double-dirty."

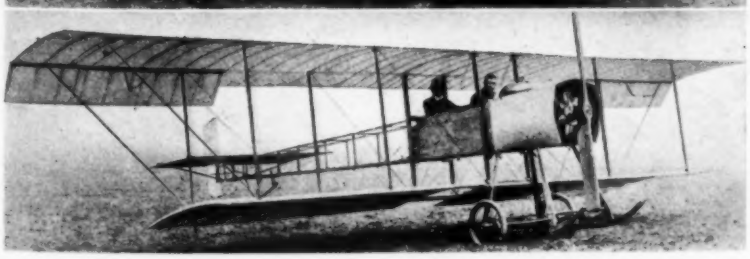
By 1911 the Short brothers realised that in spite of its many advantages the box-kite type of biplane was not ideal, and particularly that it suffered from rather excessive drag. A tractor design was put in hand for Cecil Grace, but was put in abeyance when he was lost in the Channel. Once more Frank McClean came to the rescue, and the 70 h.p. Short tractor biplane was completed in November of 1911. It was first produced as a landplane, but was later fitted with a single central float and outboard wing floats and was flown successfully as a seaplane. The seaplane version was bought by the Admiralty, and may, perhaps, be said to have marked the beginning of Shorts as primarily a marine aircraft firm.

With their experience in multi-engined aircraft it was natural that when Short brothers had ascertained the advantages of the fuselage type they should apply to it the twin-engined principle. The first machine of this type, produced in 1912, was the S.47. It was fitted with two 50 h.p. Gnome engines, one mounted in the nose and the other a short distance behind it. The front engine had direct drive, while the rear had chain drive to two tractor airscrews placed out on the wings.

Towards the end of 1911 the Short S.41 was designed and was finished early in 1912. At first fitted with a wheel undercarriage, it afterwards had twin floats substituted, and in this form it did much good flying, piloted by Commander Samson. It was gradually developed and improved, and of the seven Short machines which carried out the raid on Cuxhaven on Christmas Day, 1914, three were improved S.41 types. As water-cooled engines of greater power than the 100 h.p. Gnome rotary of the prototype became available they were installed, with corresponding improvement in performance.

It was in 1912 that Short Brothers began to give proof of the ability of aircraft to operate from warships. In January of that year Commander Samson flew a Short pusher biplane off a staging erected on the deck of H.M.S. *Africa*. The machine was fitted with air bags so that it would float if it should be forced to alight on the water. The first take-off was successfully made while the vessel was at anchor in Sheerness harbour. Later the feat was repeated from a platform on the deck of



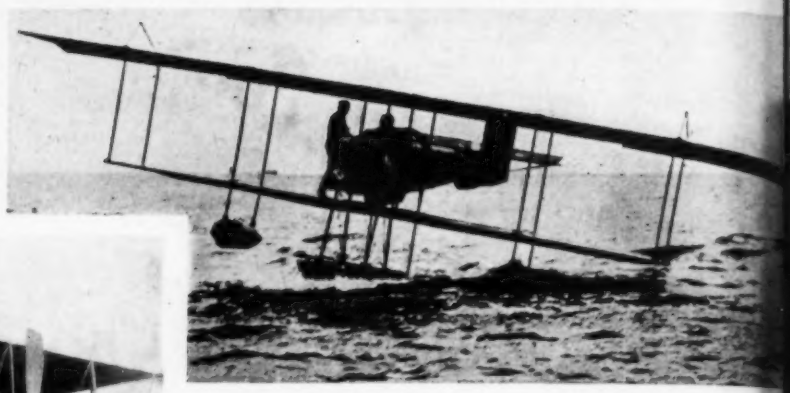


The "Triple Twin" (upper picture) had two rotary engines and three airscrews.

Search for better efficiency led to the first Short tractor biplane (70 h.p. Gnome rotary).

(Right) A development of the first tractor biplane had a single central float and two outboard air bags for stabilising.

(Below) Triple airscrews and twin engines: The second engine, out of sight, is inside the fuselage, in line with the chains.



H.M.S. *Hibernia* at the Naval Review. In this case, however, the vessel was travelling at 15 knots.

Reference has already been made to the transfer of the Short works from Eastchurch to Rochester. The float department was transferred first, about one week before the outbreak of war, and the rest followed gradually. By this time many patents relating to seaplanes had been taken out. For example, there were patents on air bags for flotation, on sprung floats, and, most important of all, on folding the wings of a biplane.

During the war period a great many seaplanes were built. Most famous of them all was the "Two-two-five." This machine derived its name from the power of the Sunbeam engine, which was 225 h.p., and although many other engines were fitted at various times, such as the Canton-Unne water-cooled radial and later the Rolls-Royce Falcon, the generic name for that particular family of Short seaplanes will always be the "Two-two-five."

This machine, by the way, was the first seaplane to be designed specifically for carrying a torpedo. Earlier Shorts had carried torpedoes experimentally, but in this design the requirements were met from the first. In modified form it persisted throughout the war, and did good work not only as a torpedo-plane but for long-range reconnaissance and anti-submarine patrol.

In addition to machines of their own design, Short Brothers built large numbers of D.H.9s during the war, and also a number of F-boats, which were developments of the Curtiss.

During the war Shorts had the misfortune to lose the eldest brother, Horace. He had been regarded as the technical head of the firm, and on his death the task of making decisions fell to Oswald, who, although the youngest of the three brothers, had already shown his great ability in judging men, and who had gradually collected around him a team thoroughly capable of carrying out the great traditions of the firm. Most of them are still with Shorts, and to their individual abilities and their good team-work can be attributed the position occupied by Short Brothers to-day. Among those who are now directors of the firm may be mentioned Mr. Arthur Gouge, general manager and chief engineer, who joined in 1915; Mr. A. E. Bibby, works manager, who joined Shorts in 1910; Mr. J. H. Wood, now secretary, who joined in 1914; Mr. W. P. Kemp, works manager, who joined in 1917; and Mr. Francis Short, son of Horace Short.

Reference has already been made to Mr. P. M. Jones, who joined the firm in 1909. Others who hold responsible positions, and their length of service with Shorts, are: Mr. C. P. T. Lipscomb, assistant chief designer (25 years); Mr. John Lankester Parker, chief test pilot (23 years); Mr. W. C. Jackson, works manager (20 years); and Mr. W. Newnham, works superintendent (19 years).

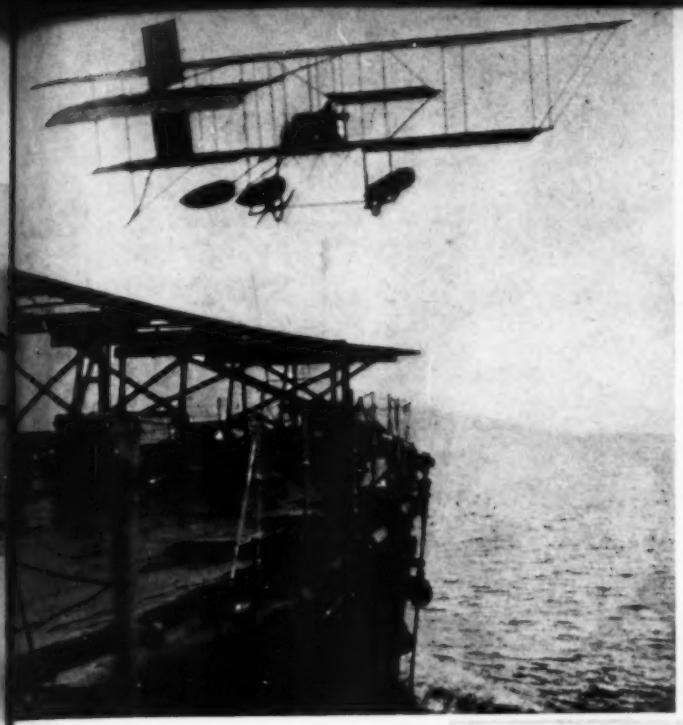
Airship Work

The undertaking at Rochester was not the only one in which Short Brothers engaged. During the war airship works were established at Cardington, and a design office was set up in Bedford. Mr. C. P. T. Lipscomb took charge at Bedford and remained there until the Government took over the airship works as a "dockyard for airships" in 1921. The first Short-built airship, R.31, was launched in 1918. Like her sister ship R.32, she was built of wood. The R.32 was used as a training ship for the American crew which was to take over R.38. The first all-metal airship, the R.37, was only half completed in order to go on with the Government-designed R.38 which, as our readers will remember, was lost over the Humber.

After this brief excursion to Cardington we may return to Rochester and its post-war history. In 1918 was designed the Shirl, a tractor biplane with 375 h.p. Rolls-Royce Eagle engine. This machine was designed to carry an 18in. torpedo for the destruction of enemy shipping. It could take off from land or from the deck of a ship. For emergency it was fitted with air bags to keep it afloat. Previous Short torpedo-planes had been seaplanes. The Shirl was a landplane. After the war it was fitted with a streamline mail container instead of the torpedo, and a special version was fitted with a long-range tank for the flight across the Atlantic. Alcock and Brown made the flight in a Vickers Vimy, and the Shirl was never put to the test of crossing the Atlantic. It had the range.

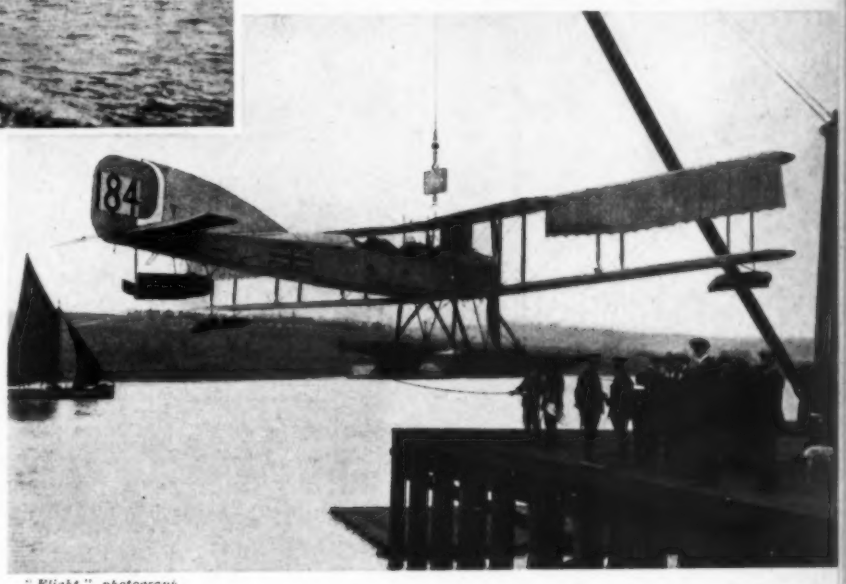
When the post-war slump came, Short Brothers kept their workmen together as best they could. For several years they employed a great many on building bodies for motor buses, thus keeping the firm going

With the S.41 (100 h.p. Gnome) Shorts, in 1912, laid the foundation for their famous seaplanes. The machine in the picture was piloted by Commander Samson, and the passenger was Mr. Winston Churchill, then First Lord of the Admiralty.



(Above) An historic event : In 1912 Commander Samson flew a Short S.38 (modified) off a platform on the deck of H.M.S. *Hibernia* while the vessel was travelling at 15 knots.

(Right) The foundation of a seaplane reputation : One of the first torpedo-carrying seaplanes of the "Two-two-five" type being launched at Rochester in 1915.



"Flight" photograph.

and keeping together the skilled design staff so laboriously collected during the previous years. That is not to say that Shorts abandoned aircraft work altogether. Far from it. Much experimental work was done, and many types of aircraft were built.

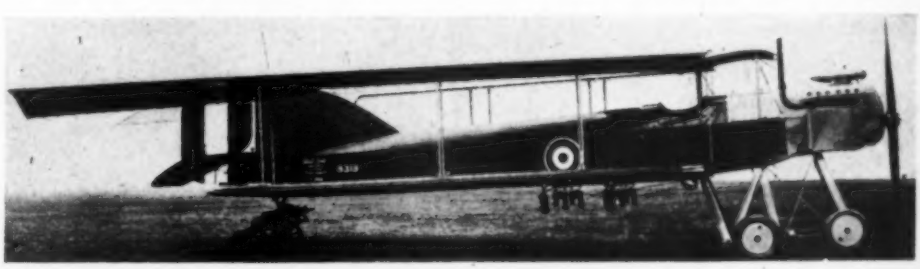
In these days of so-called "stressed-skin" construction sight is apt to be lost of the fact that Mr. Oswald Short personally sketched out the main scheme as early as 1919, and Short Brothers then began to experiment with metal-clad structures. A portion of fuselage was made up and tested in order to get an idea of its strength. (In those days one could not calculate the strength of a shell.) The results were good, and a complete machine was built. This, the Silver Streak, was a normal biplane as regards its aerodynamic design, but the fuselage was a light metal shell, reinforced by stringers, and the wings had a thin covering of sheet metal. Shorts vainly tried to convince the Air Ministry that metal-clad aircraft were the future type, and for some time little progress was made. Ultimately, however, Shorts did get an order for making an all-metal hull for one of the F-boats. That was really the beginning of subsequent Short all-metal history. But it is only fair to place on record here the fact that Shorts did pioneer stressed-skin construction. For that they have never had the credit which is their due. The Silver Streak was exhibited at the Olympia Show in 1920.

At home relatively little was heard of Shorts' work during this period. A substantial order for F-5 flying boats was, however, received from the Japanese government. The machines were partly finished at Rochester and finally completed in Japan. In 1921 a twin-engined service flying boat, the Cromarty, was built for the Air Ministry.

The Silver Streak was built to try the structure and not with the idea of conforming to any particular Air Ministry specification. However, the machine was bought by the Air Ministry and tested to destruction, the vibration and corrosion tests lasting for nearly two years. As they gave promising results, Shorts built an all-metal machine to an Air Ministry specification. This was the Springbok, a two-seater fighter fitted with Bristol Jupiter engine. The stressed-skin fuselage feature was retained. The machine, built in 1923, was not ordered in quantities.

In 1924 Shorts built their first all-metal flying boat. This machine became known as the Cockle. It had originally been ordered, by cable, by Mr. Lebbaeus Hordern, of Australia, but he changed his mind about the purchase and ultimately the machine was bought by the Air Ministry. The Cockle was fitted with two Blackburne motor cycle engines of 696 c.c. each. Needless to say, the machine was under-powered, but it provided valuable experience and enabled the task of building a large all-metal flying boat to be undertaken with assurance.

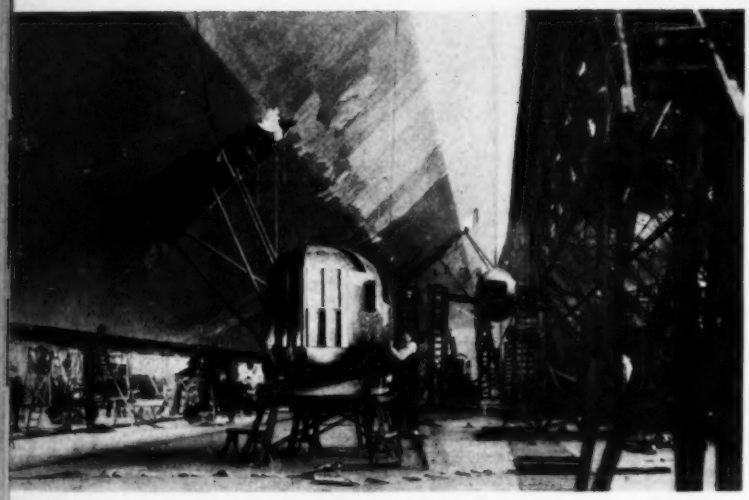
In 1924 Shorts built their first all-metal light landplane. The machine took part in the Lympne competition the following year, but was, not unnaturally, somewhat heavy for the little 33 h.p. Bristol Cherub engine with which it was fitted. In that small size it was difficult to get down to the gauges of metal which would have sufficed for the flying loads, and for practical reasons heavier gauges had to be used in many places, with consequent increase in



Wing-folding was incorporated in the Short bomber of 1916. This machine had a span of 85ft. and carried a machine gun and four 250 lb. bombs. The engine was a Rolls-Royce Falcon.

The Shirl (left) was designed to carry an 18in. torpedo. In the picture the container under the machine was intended for carrying mails, or a long-range tank could be carried instead.

Early stressed-skin construction : A test section of a fuselage was built and tested by Short Bros. in 1919. Note the shear wrinkles.



It is often forgotten that Shorts built airships during the war. This photograph shows the R.38 in course of construction at Cardington.

weight. However, the machine flew very well in view of its low power.

Then followed a period during which Shorts had very little encouragement from the Air Ministry. Civil flying absorbed but few aircraft and military orders were few and far between. While bodies of omnibuses provided the firm with "bread and butter," development work went on, and a considerable number of seaplane floats were built during this time for other firms' machines. Among outstanding successes may be mentioned the pair of floats built for Sir Alan Cobham's D.H.50, on which he flew from England to Australia and back. On that flight the floats were thoroughly tried out in all sorts of climates, and had some rough treatment.

The company had already had experience in the construction of commercial floatplanes—the Shrimp, which was produced just after the War, carried a pilot and three passengers. Originally it was powered with a Beardmore engine of 160 h.p., though a Puma was subsequently installed. Three machines of the type were built.

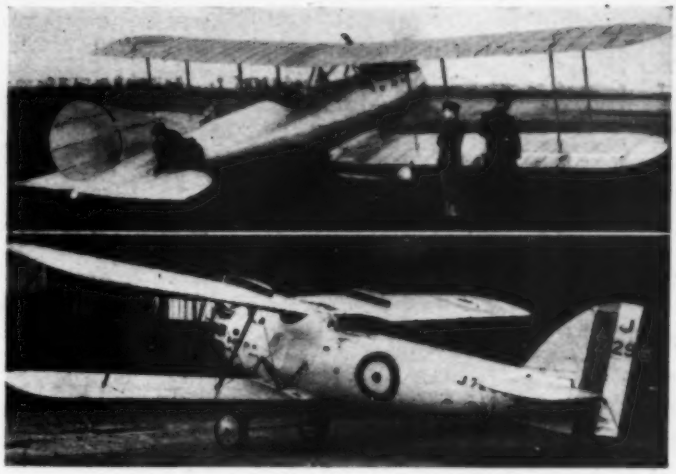
A notable Service type which appeared at approximately the same time as the Shrimp was the Cromarty twin-engined flying boat with Rolls-Royce Condors. This was a biplane boat, and the top wings had a marked overhang. The influence of the F-5 boats was apparent in its design though the hull form was unique, particularly as regards the design of the planing bottom, the concave section of which was intended to give gradual entry into the water. Originally the machine was designed to have guns mounted in nacelles on the top wing outboard of the airscrews.

Data for the Cromarty were: Span, 112ft.; length, 60ft.; height, 23ft.; weight loaded, 18,500 lb.; top speed, 96 m.p.h.

Under construction at Rochester in 1926 was a military flying boat which may be regarded as the connecting link between the metal-hulled F-5 and Cromarty and the Singapore III. which is still employed in general reconnaissance units of the Royal Air Force. The machine in question was the Mark I version of the Singapore, which was built entirely of metal with the exception of the wing covering. The first reference to this machine was made in *Flight* during June, 1927, when the boat was undergoing tests fitted with two Rolls-Royce Condor engines. It was claimed that the Singapore could fly, even when carrying full military load, with one of the Condors cut out. Moreover, the freedom from water soakage, due to the metal hull, permitted a large useful load to be carried.

The Singapore was a shapely boat with biplane wings of unequal span, the engines being mounted between them. Three Scarff mountings carried defensive Lewis guns and bomb racks were fitted beneath the lower wings. As a Service type it carried a crew of five.

Shorts made the first all-metal hull for a flying boat. The wooden superstructure of the F-5 was retained. The hull had a fluted planing bottom.



The Silver Streak (right) was built entirely of metal and was shown at Olympia in 1920. Built to a military specification, the Springbok (right, centre) was a development of the Silver Streak.

From November 17, 1927, until May 31, 1928, a Singapore was being used by Sir Alan Cobham and a crew of five (including Lady Cobham) on a survey flight round Africa. A distance of 9,950 miles was covered in 100 hours 34 minutes flying time, demonstrating the potentialities of the type.

The subsequent development of the Singapore will be outlined later, though already, in 1927-28, the finer features of the design were being reproduced in a three-engined civil flying boat known as the Calcutta. Hull construction was similar, there being a series of annular frames to which the metal sheets were riveted. Fore and aft were light intercostal members acting as local stiffeners. Actually, the first Calcutta was launched on February 13, 1928. In manufacturers' trials and in official tests at Felixstowe the machine demonstrated its ability to fly with full load on any two of its three geared Bristol Jupiter IX engines, which delivered a combined output of 1,575 h.p. Flying at an all-up weight of 20,500 lb. (the empty weight was 12,800 lb.) the Calcutta showed a maximum speed of 103.8 knots and an initial rate of climb of 710 ft./min. Overloaded to 24,000 lb., she left the water in 32 seconds.

Although cramped and noisy in comparison with the Empire boats of to-day, the cabin of the Calcutta marked a new step forward in passenger comfort. The fifteen seats were arranged in rows of three; they were fitted with detachable cushions which could be used in emergency as lifebelts and each was provided with a considerable table. The amenities of the Calcutta included a kitchen and a lavatory.

A notable contribution to high-speed research was the Crusader racing seaplane produced by the Schneider Trophy—a beautiful low-wing monoplane fitted with a "helmeted" Bristol Mercury radial engine. This machine was designed by Mr. W. G. Carter and was of wooden construction. Although its maximum speed was lower than that of contemporary aircraft fitted with water-cooled engines the Crusader provided a good deal of valuable experience before she was accidentally crashed because of negligence in rigging the controls.

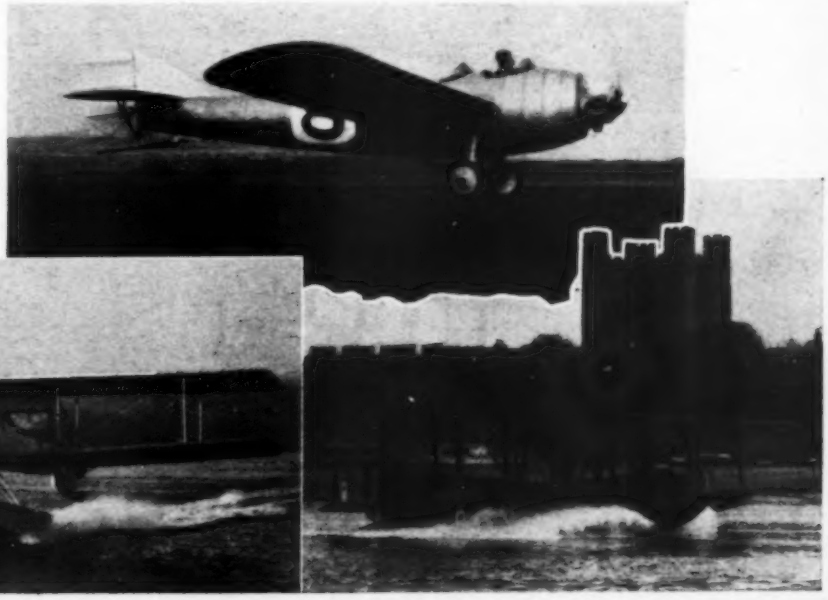
Short's first all-metal flying boat was the little Cockle, with two Blackburne motor cycle engines.

The Singapore continued to be developed with liquid-cooled engines, the Condors being replaced in 1928 by two Rolls-Royce H.X vee-twelves (Buzzard type) of 800 h.p. each. With these units the Singapore showed a top speed of 128 m.p.h., a service ceiling of 15,500ft., and a range at cruising speed of 900 miles.

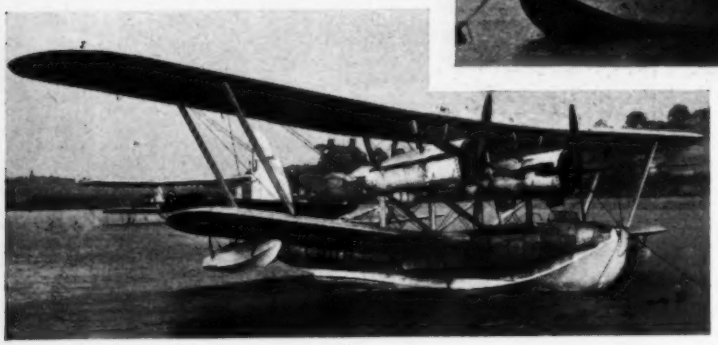
To meet specific Service requirements the company produced a militarised version of the Calcutta. This was christened the Rangoon and did excellent service in the East—particularly in the Persian Gulf—over a period of years as the equipment of No. 203 (F.B.) Squadron.

The success of the civil and military versions of the

The Short Satellite (right) with Bristol Cherub engine was the first all-metal light aeroplane. It appeared in 1924. Below are the Shrimp, produced just after the war, and carrying a pilot and three passengers; and the Cromarty, with two Rolls-Royce Condors.



The Singapore I of 1927 (below) was originally fitted with Rolls-Royce Condors, though Buzzards were eventually substituted. On the right are two developments of this machine—the Singapore II and III, each with four Rolls-Royce Kestrels. The Singapore III still forms the equipment of a number of R.A.F. General Reconnaissance Squadrons.



The Valetta, shown above in landplane and seaplane forms, makes an interesting comparison with the Calcutta flying boat, which had similar power plants. A Valetta was flown to South Africa by Sir Alan Cobham in 1931, though this trip is not to be confused with his circuit of the same continent in a Singapore.

"Flight" photographs.

Calcutta was such that the Breguet concern acquired the licence to construct them in France, and even to-day passengers in the Short Empire flying boats may see these fine old craft operating from the Etang de Berre, near Marseilles.

Despite the outstanding success of the Calcutta type many people felt (and still feel) that for certain duties the twin-float seaplane was superior to the flying boat. There was also an agitation for the construction of a large commercial monoplane, so Short Bros. and the Air Ministry determined to explore the possibilities of a high-wing monoplane float-plane which would be easily convertible to a landplane and having the same power plant as the Calcutta.

In structural design the Valetta, as the big monoplane was called, followed quite closely that of the Calcutta, despite the dissimilarity of layout.

More valuable experience was gained by converting the Valetta into a landplane. Among the following figures those in brackets apply to the Valetta as fitted with a land undercarriage: Weight empty, 14,535 lb. (13,985 lb.); weight loaded, 22,400 lb. (21,850 lb.); top speed, 135 m.p.h. (138 m.p.h.); initial rate of climb, 850 ft/min. (880 ft/min). After a period of instructive experimental flying the Valetta was made into an aerial wireless laboratory.

Smaller Landplanes

It may have been inferred that since 1926 Short Bros. had been concentrating exclusively on the development of very large aircraft. This was, in fact, by no means the case, for apart from the Crusader racing monoplane already mentioned, they had tested the Sturgeon three-seater reconnaissance seaplane, the Chamois army co-operation machine and fighter, and the Gurnard fleet-fighter reconnaissance type and had developed a unique amphibian undercarriage.

The Sturgeon was fitted with a 450 h.p. Bristol Jupiter engine and was of classic Short construction. Similar in many respects to the Sturgeon, the Chamois was a landplane (actually a development of the Springbok) with the pilot placed beneath the centre section of the top wing, in which there was a

The Short amphibian undercarriage was applied to a Gurnard, a Mussel and a D.H. Moth. The Moth installation is seen on the left.

"Flight" photographs.

hole for his head. The Gurnard resembled the two last-named types in that it was a biplane with wings of unequal span. It was produced for a two-seater fleet-fighter-reconnaissance competition and appeared with Rolls-Royce Kestrel and Bristol Jupiter engines, with wheels and twin-float undercarriage and finally with the patented Short single-float amphibian undercarriage. Undercarriages of somewhat similar layout were also applied to the little Short Mussel and to the De Havilland Moth. The Mussel, it may be recalled, had originally been built as a twin-float machine.

By 1931 the Singapore had developed into a four-engined type with triple fins and rudders, even better hull lines and a cleaner wing cellule. With these innovations it was known as the Singapore II and soon established itself as the fastest flying boat of its size in the world. A particularly notable development making for greater military efficiency was the gun position in the extreme tail, behind the central rudder.

Four engines also featured in a new civil type produced for Imperial Airways in 1931. Originally known as the Kent (though the contractors' type-name Scipio was eventually adopted) this boat was in many respects an enlarged Calcutta. It carried sixteen passengers in greater comfort than had its forerunner and was powered with four Bristol Jupiter X FBM geared engines, giving a combined maximum output of 2,400 h.p. at 5,000ft. Performance figures at the maximum loaded weight of 32,000 lb. were quite a step forward as compared with the Calcutta. For example, at 5,000ft. the boat would cruise comfortably at 105 m.p.h., the maximum speed at the same altitude being 137 m.p.h. Ceiling and range were respectively 19,500ft. and 450 miles. Machines of this class gave long and meritorious service on the Mediterranean routes of Imperial Airways, eventually being replaced by the Empire boats in use to-day.

As far back as 1928 the Air Ministry had expressed a desire for a very large Service flying boat with six engines. Three or four years later their requirements were met by a huge Short biplane originally known as the R.6/28 and subsequently christened the Sarafand. The engines—Rolls-Royce Buzzards of 850 h.p. each—were arranged in tandem pairs between the wings which, unlike those of earlier Short biplane flying boats, were of equal span. As in the Singapore II, each pair of engines was arranged on a pair of interplane struts, the radiators being placed between the nacelles and the lower main planes. For a long while the R.6/28 was regarded as a "hush-hush" type, but when figures were eventually released they showed a top speed at sea level of 150 m.p.h.; a range, with full military load, of 1,450 miles; and a take-off time (with the boat overloaded to 70,000 lb.) of 47.5 seconds. Optional armament in the bow turret was a one-and-a-half-pounder automatic shell-gun.

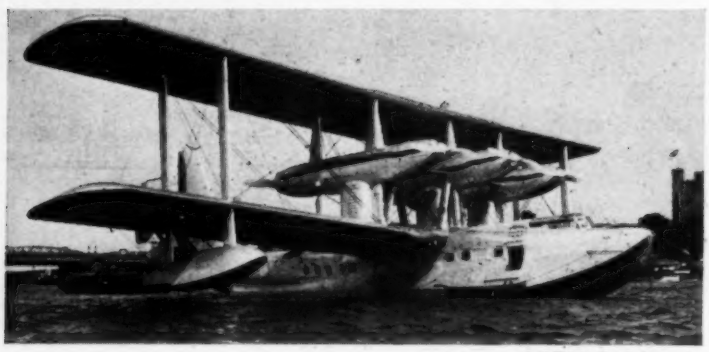
The construction of the Sarafand—largest of all the Short types—preceded that of the smallest multi-engined commercial machine to find useful application—the little Scion with two Pobjoy engines. The Scion, which is still used in several parts of the world, has a wing built round a single duralumin box girder, the covering being of fabric, though the fuselage is of welded steel tubes, also with fabric covering. The two Pobjoy Niagara engines are carefully cowled and set ahead of the wing and the undercarriage is fixed. The cabin seats five passengers. Landplane and seaplane versions have been built, figures for the landplane being: Top speed 128 m.p.h., cruising speed 116 m.p.h., range 390 miles.

Parallel with the development of the Scion the Singapore in its Mark III form was being delivered to R.A.F. units, and a landplane version of the Kent, or Scipio class, was being completed to the order of Imperial Airways. Two examples of this type were built, and under the names of *Scylla* and *Syrinx* have been used to great advantage on the cross-Channel route of Imperial Airways for the past four or five years. The superstructure of the *Scylla* type is almost identical with that of the Kent. The fuselage has a primary structure of lattice girders and built-up longerons with a covering of corrugated light alloy. With four Bristol Jupiter XF BMs the *Scylla* cruises at 105 m.p.h. and has a top speed of 137 m.p.h. flying at an all-up weight of 32,000 lb. Bristol Perseus sleeve-valve engines have been installed experimentally.

"Flight" photograph.

Londoners were treated to a close-up view of Britain's then latest commercial flying boat when, in 1928, Mr. Lankester Parker, with Mr. Oswald Short on board, put a Calcutta down on the Thames at Westminster for M.P.s to inspect.

The Gurnard (left) was a two-seater fleet-fighter-reconnaissance machine and was fitted with a variety of undercarriages.



"Flight" photograph.

The R.6/28 was second in size only to the German Do.X. Its Service name was Sarafand, and it had six Rolls-Royce Buzzard engines.

"Flight" photograph.

Developed from the Calcutta, the Rangoon (three Jupiters) did excellent service in the Persian Gulf

Scylla—one of the largest four-engined landplanes ever built—was followed by what is probably the smallest—the Scion Senior. Embodying all the excellent features of the twin-engined Scion, the Senior model has been flown as a landplane and seaplane. Fitted with Pobjoy Niagara III engines of 90 h.p. each the machine has the following characteristics: Span, 55ft.; all-up weight, 5,750 lb.; top speed, 145 m.p.h.; cruising speed, 126 m.p.h.; cruising range, 420 miles.

The "drawing-board" order for 28 four-engined commercial flying boats received from Imperial Airways in 1935 was, apart from its Imperial significance, one of the greatest compliments ever paid to an aircraft manufacturer. The machines concerned were designated the Empire Class, and soon after its launch in July, 1936, the first machine had proved that its magnificence lay not only in its appearance. The Empire boat was, and still is, one of the finest-looking marine aircraft ever built. The hull is very deep and has two decks. The upper deck houses the crew, and a mail compartment, while below is accommodation for twenty-four passengers and additional baggage or cargo. For night flying sixteen passengers can be accommodated in bunks.

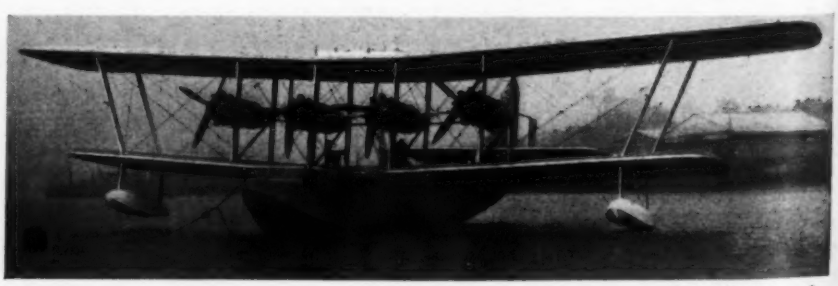
The high cantilever monoplane wing is built round the central girder, which embodies two spars of extruded sections braced by tubular struts. Like the hull, the wing is covered with smooth Alclad sheeting. An important contributory factor to the high performance of the machine is the installation of the Gouge trailing-edge flaps which, in addition to providing the normal flap effect, increase the effective area of the wing.

High Performance

The engines, installed ahead of the wing in gilled cowlings, are of the Bristol Pegasus Xc type, each giving a take-off output of 920 h.p. The normal Empire boat carries 650 gallons of fuel, although the special long-range version, planned for Transatlantic operation, has tankage for 2,320 gallons. Data for the Empire boat are: Span, 114ft.; length, 88ft.; height, 31ft. 10in.; wing area, 1,500 sq. ft.; tare weight, 24,000 lb.; weight loaded, 40,500 lb.; top speed, 200 m.p.h.; maximum cruising speed, 170 m.p.h.; take-off time, 21 sec. Although the ceiling was estimated at 20,000ft. an Empire boat has actually been taken up to 25,000ft. Frequently, when carrying mails and cargo across France, the boats cruise at a height of 18,000ft.

The two specially developed long-range boats, *Caledonia* and *Cambria*, made ten highly successful experimental flights between England and America in 1937. *Cambria* on her last west-east trip averaged 190 m.p.h. over the 2,000 miles between Botwood, Newfoundland, and Foynes, Eire.

A modification of the Empire boat was chosen for one of the most daring aeronautical experiments ever made—the Short-Mayo Composite aircraft. Briefly, the Mayo Composite scheme entails the mounting of a comparatively



"Flight" photograph.

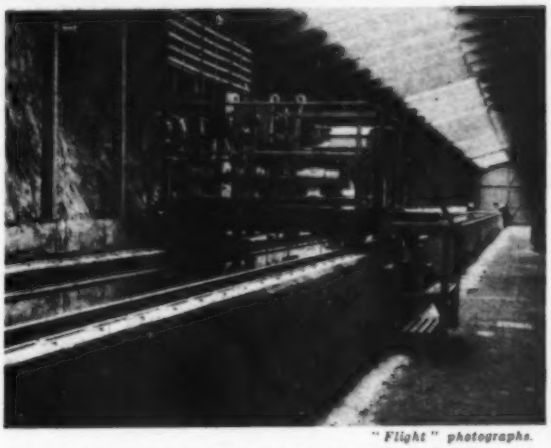
The first of the large four-engined commercial flying-boats was the Kent (Scipio) which was used for many years on the Mediterranean route of Imperial Airways.

Interchangeable wheel and float undercarriages gave the popular little Scion (above and left) a wide field of application. Popularly known as the "Knuckleduster" the flying boat below was fitted with two Rolls-Royce Goshawk steam-cooled engines.

small, heavily loaded aircraft on the back of a larger, comparatively light and high-powered machine. In the first combination, which has proved extraordinarily successful, the upper component is *Mercury*, a twin-float high-wing monoplane fitted with four Napier Rapier H-shaped engines and carrying fuel for a range of about 6,000 miles. The lower component, *Maia*, is similar to an Empire boat but has rather larger wings and different hull lines. *Maia's* hull carries two steel pylons connected by a cross-member supporting the upper component. At a selected height the pilots of each aircraft operate releases and the excess lift of *Mercury's* wings carry her up and away from *Maia*. The lower component can easily be converted into a normal commercial flying-boat.

The Composite aircraft was completed toward the end of 1937, and the first separation was made on February 6 of the following year. Among the achievements of *Mercury* are a flight from Foynes to New York (via Montreal) in 22 hours 31 minutes flying time; and a trip non-stop from Dundee to the Orange River, South Africa.

The exceptional qualities of the Empire flying boat were soon recognised by the Royal Air Force, and orders were placed for a number of military derivatives. The type evolved is known as the Sunderland, and, though in essentials it resembles its forerunner, there are a number of interesting differences, notably the knife-edge rear step in place of the normal transverse type. The engines of the Sunderland are of a more recent type than those of the Empire boat (Pegasus XXII) and give 1,010 h.p. for take-off. Data are: Span, 112ft. 9½in.; weight, empty, 28,290 lb.; maximum permissible weight, 49,870 lb.; top speed, 210 m.p.h.; maximum cruising speed, 178 m.p.h.; climb at sea-level, 1,200ft./min.; take-off, 23 sec.; normal range, 1,670 miles. Power-driven gun turrets are located in the bow and stern, and there is additional armament amidships. The bomb load is stowed internally.



"*Flight*" photographs.

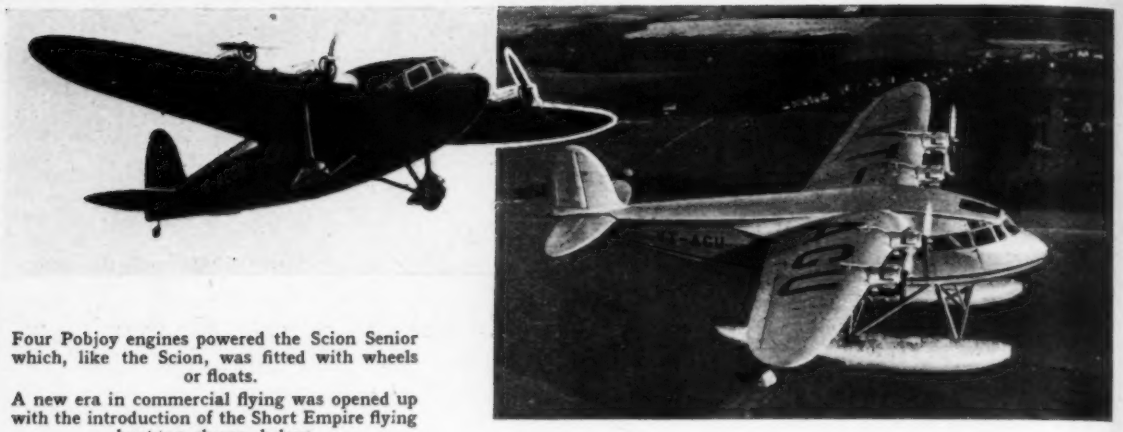
One of the reasons for the success of the Short flying boats is that models are tested in this tank before the actual machine is built.

During delivery flights to Singapore Sunderlands have recorded some very fast average speeds.

As the nucleus of a Transatlantic flying boat fleet, Imperial Airways have acquired four modified versions of the Empire boat. The main differences lie in their greater structural strength, enabling them to carry a much heavier load; the installation of sleeve-valve engines; and the provision of apparatus for mid-air refuelling. Each of the new machines can take-off with 1,500 gallons of fuel, and take on board a further 1,000 gallons from a special tanker aircraft. Three more machines of similar design have been supplied for the trans-Tasman service between Australia and New Zealand. Like

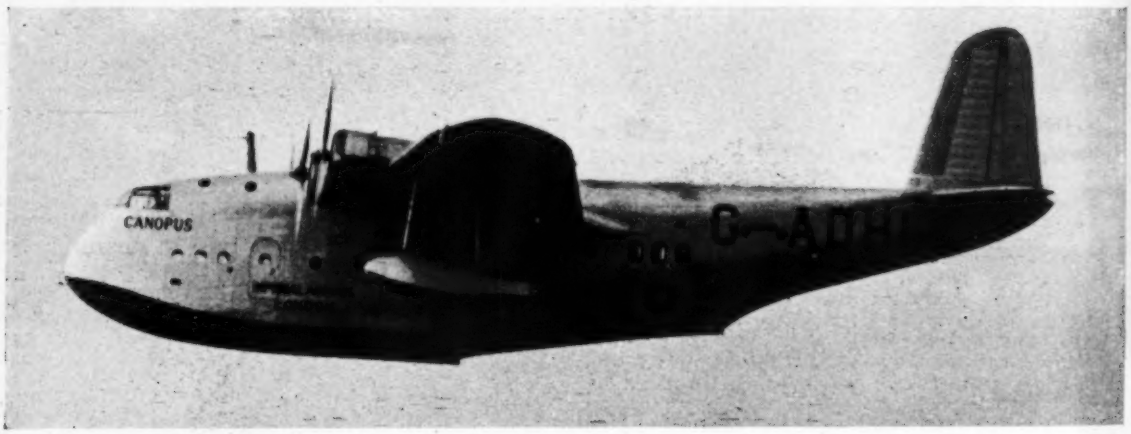
"*Flight*" photograph.

In the *Scylla* the superstructure of the *Scipio* was applied to a landplane fuselage. The engines are four Jupiters.



Four Pobjoy engines powered the Scion Senior which, like the Scion, was fitted with wheels or floats.

A new era in commercial flying was opened up with the introduction of the Short Empire flying boat as shown below.



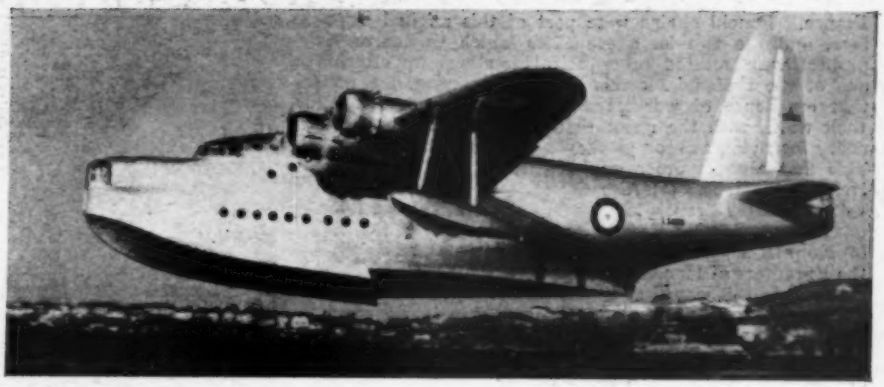
the transatlantic machines, these have Bristol Perseus XIIc sleeve-valve engines, though they will not make use of aerial refuelling.

At present under construction at Rochester are three flying boats of the "G" class. These will resemble the Empire boat in general layout, but will be much larger and will be powered with four Bristol Hercules fourteen-cylinder sleeve-valve engines, each rated at 1,025 h.p. at 3,000ft. and having a take-off power of 1,380 h.p. The span will be 134ft. 4in.; the length, 101ft. 4in.; the wing area, 2,160 sq. ft.; and the wing loading, 33.3lb./sq. ft. Flying at an all-up weight of 72,000 lb., the boats will have a range of 2,500 miles against a 40 m.p.h. head wind, cruising at 175/180 m.p.h. Their total tankage will be 3,600 gallons.

To Air Ministry Specification 14/38, the company is also engaged on the production of two versions of a four-engined civil landplane. The Hercules engines installed in this machine will develop 1,600 h.p. each for take-off and will drive constant-speed Hydromatic airscrews. One version, intended for operation at 10,000ft. (Type A), will have Hercules engines rated at 1,250 h.p. at 3,500ft., while those installed in Type B, for operation at 25,000ft., will be rated at 1,100 h.p. each at 22,000ft. Dimensions are: Span, 127ft. 6in.; length, 89ft.; height, 22ft. 9in. and the wing area is 1,800 sq. ft. The tare weight of Type A with complete equipment will be 39,050 lb., the payload and crew of four will account for 8,000 lb., and the all-up weight will be 71,000 lb. The Type B will fly at a similar all-up weight, though the

A number of extraordinarily fine flights made by *Mercury*, the upper component of the Short-Mayo Composite aircraft, have fully vindicated this daring experiment.

"Flight" photographs.



The Short Sunderland military flying boat, which is capable of 210 m.p.h., has been developed from the commercial Empire type. The engines are four Pegasus XXIIs.

tare weight will be 41,310 lb. and the weight of the payload plus crew will be 8,800 lb. Performance figures for the Type A will be: Cruising speed, at 10,000ft., 246 m.p.h.; service ceiling, 20,200ft., and still-air range, 3,420 miles. Figures for the Type B machine are expected to be as follows: Cruising speed at 25,000ft., 275 m.p.h.; service ceiling, 32,500ft.; still-air range, 3,370 miles. Pictures of a model will be found on p. 394.

First of the strengthened Empire class, fitted with Perseus sleeve-valve engines and designed to carry a greater payload, is *Cabot*, seen taking off from the Medway.

"Flight" photographs.

THE SHORT BROTHERS

A Personal Tribute by Griffith Brewer

Mr. Griffith Brewer started ballooning in 1891. He is an active aeroplane pilot today.

"Flight" photograph.

WHEN Wilbur Wright came to France in 1908 and demonstrated to a disbelieving world that flight was possible, there were, naturally, no aircraft factories. There were, however, some aeronautical constructors who supplied the very limited demand of a handful of balloonists who required balloons to race amongst themselves and to take to countries overseas to compete for cups offered by enterprising sportsmen. There was no thought of gain amongst the balloonists in the beginning of the present century.

It is to the Hon. Chas. Rolls that the credit is due for "discovering" Short Brothers. Eustace (then in his early twenties) and his brother Oswald, still in his teens, composed the aeronautical firm of Short Brothers, whose chief asset and guarantee for their future was a genius for excellence in workmanship, and an industry and perseverance which would carry them through enormous difficulties.

My first personal contact with the Short Brothers was when they reconditioned the balloon used by Santos Dumont in the Gordon Bennett race in 1906, ready for me to pilot with my *aide*, the Hon. Claud Brabazon, in competing for the Gordon Bennett Cup from St. Louis in America in the following September, 1907. Later, when Shorts built the *Bee* for me, an 18,000 cubic feet rubber fabric hydrogen balloon, I was better able to appreciate the meticulous care and skill in their manufacture. It was about this time that Short Brothers were awarded the first prize at the Aero Club Exhibition "for excellence of construction."

These were my early experiences with the Shorts, and it therefore was not surprising that, when I became associated with the Wright Brothers at Pau at the time when Wilbur Wright was making his flying demonstrations, I should suggest their name to Wilbur Wright when he enquired which firm in England would be most suitable to manufacture the first six flying machines on behalf of Wilbur and Orville Wright. I naturally replied that the only firm with any experience in aeronautics at that time, namely, in January, 1909, was Short Brothers, and at Wilbur Wright's request I telegraphed to them to come over to Pau to take particulars for making the first six flying machines to be used in England. This was the first aircraft order given up to that time, and in undertaking it Short Brothers became the first firm of aircraft manufacturers in Great Britain.

In developing their manufacture from balloons to aeroplanes they acted in the energetic way which justified my recommendation to Wilbur and Orville Wright. They had already built sheds at Shellbeach and were able to undertake the manufacture as soon as Horace Short, who had joined his brothers, had, in company with Eustace Short at Pau, gathered all the particulars which were necessary from the machine which Wilbur Wright was flying in demonstration of the advent of flight.

Horace Short, who was older than the original partners, had given up his post as experimental engineer to the Hon. Chas. Parsons of steam-turbine fame in order to join his brothers. The manufacture at Shellbeach started with the regular Short energy and skilful workmanship in the wood and fabric structure with the apparently simple mechanical parts adapted to receive the engine, which would be delivered from the engine factory in

France. Renold chains were part of this original structure, and the two large propellers which were used as pushers were rotated in opposite directions by crossing one of the chains. All this work was carried out with that excellence of workmanship which characterised all their work, with the result that these six machines were ready for flying as soon as the engines could be obtained. This first aircraft order was distributed as follows: (1) Hon. C. S. Rolls. (2) Alec Ogilvie. (3) Frank McClean (afterwards Sir Francis McClean). (4) Hon. Maurice Egerton (afterwards Lord Egerton of Tatton). (5) Cecil Grace. (6) Hon. C. S. Rolls (machine bought by Alec Ogilvie from the Executors of Hon. C. S. Rolls).

It was in this way that the Short Brothers, aeronautical engineers, surmounting all the difficulties of early manufacture, developed into the first aircraft manufacturing firm, and which has continued to advance and has progressed ever since. That progress has been constant and was guided at the first mainly by the elder brother, Horace, and later by the youngest brother, Oswald.

Stressed-skin Pioneering

It was towards the end of the war that the elder brother Horace died, leaving Eustace and Oswald to carry on the great undertaking and the still greater trial of reorganising the work when peace came and orders completely vanished. Many aircraft firms at this critical time dissolved and disappeared, but Shorts in their reorganisation first turned their attention to power launch building and then to bus body building for the London General Omnibus Company. Here, again, the character of the Short family emerged in the production of bus bodies lighter and more efficient than the bodies earlier in use.

Not finding the enthusiastic support which he had hoped to find in England for his stressed-skin type of constructions Oswald decided to visit the United States, and I shall always recollect with pride and pleasure his invitation for me to accompany him on a visit to the aircraft firms in America in the summer of 1922. This visit did not result in the aircraft industry in America taking up the Shorts' enterprise over there, but it did have some value in crystallising their outlook, so that when Oswald returned to England he persevered with the aircraft side of the business.

In 1931 the firm suffered the loss of the second of the three original partners. Eustace, an idealist, was bitten by the fascination of the operation of the machines, in the same way that he was bitten by ballooning as distinct from the manufacture of the balloons, and although he took a share in the progress and organisation he left the leading role of organising and directing to the younger brother, Oswald, and spent more of his time on the practical side of flying. Eustace was a fine balloonist and many years later, when he took up flying, flew from the water. He and I compared notes on our solo flying, my efforts being solely from land, and it was a great loss to me when he died in that tragic way, drifting after making a perfect landing on the Medway.

As in the growth of all great organisations, the initiator was able to entrust more and more of the development to a scientific staff growing up like the children of a parent, and now he has the satisfaction of seeing that lifetime work, covering within my memory nearly thirty years, wholly devoted to aircraft production, not forgetting the help in the transition stage received from the launch building and bus body construction which bridged the gap until the nation was ready to receive the later product of the Empire flying boats which now span the world in all directions.

"Flight" photograph.

An historic photograph taken at Eastchurch in 1909 and showing Wilbur and Orville Wright with Horace Short and (right) Griffith Brewer, the author of this personal note on the Short brothers.

"Flight" photograph.

THE SHORT TEAM: Some of the men who have made the firm world-famous. In the front row are, from left to right, W. C. Jackson, J. H. Wood, A. Gouge, H. O. Short, Francis Short, A. E. Bibby, C. P. T. Lipscomb, and J. Lankester Parker. From left to right in the back row are Messrs. Quittenden, Wyborn, Coppins, Lawson, Watson, Boorman, Clarke, Shepherd, Dyer, Smart, Parks, Newton, Newnham, Drury and Cozens. Many of those in this group have been with the Short firm for nearly thirty years.

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THREE NEW BALANCED FLAPS

Results with a Modified Irving Design, a Slotted Flap and a Modified Zap Type

By W. E. GRAY, D.F.C.

A NUMBER of attempts have been made in the past few years to produce wing flaps with a reasonably close degree of aerodynamic balance, and at the Editor's request the following brief account is given of three designs evolved by the writer, and of the tests so far carried out on them. Whether the tardiness in adopting the more closely balanced designs that have already been tested in flight is due to excessive caution on the part of designers, or to their dislike of any mechanical complication, or (horrible thought!) to mere inertia and conservatism, is perhaps open to debate; there are no doubt some, however, to whom any fresh attempt is of interest—hence these notes. By reading between the lines the conservatives will doubtless be able to sum up just why all three attempts are so much waste of time and effort; but it was not for them that these were expended.

The main advantage in having flaps that can be applied and varied in setting easily is that one can use them as a gliding angle control while approaching to land, and so add to the safety of that operation. To feel that one has a powerful control over the gliding angle is to feel that one is more fully master of the situation, and can, in Professor G. T. R. Hill's apt words, impose one's will upon the aeroplane.

Unfortunately none of the three flaps has yet been flown, but one has been thoroughly tested on a very large model on a car at high speed, and the results may be regarded as beyond doubt, while the other two have only been tested in a tunnel at low Reynolds Number; similar tunnel tests on a plain split flap, however, are in close agreement with car tests on a like flap, and this gives a reasonably good assurance of the validity and accuracy of the tunnel results.

The Irving Flap

The first flap is of the type invented by Mr. Irving of the National Physical Laboratory nearly four years ago, and it is this one that has been tested by the car method; the Irving flap has been modified by cutting off the rear third of the lower half of the flap and re-attaching it with a hinge, as shown in Fig. 1. By giving the pilot control of this hinge the rear part of the flap may be rotated so as to upset the balance of air forces on the flap, and so control the degree of flap opening in an indirect way. The control is arranged so as to be unaffected by the degree of flap opening, so that as the flap opens the airflow strikes the controlling part at an increasing angle until equilibrium is reached and the flap takes up a heavily damped position of opening corresponding to the control setting. The initial opening movement is caused by the airflow clinging to the controlling part as it is turned slightly into the wing, and the suction thus caused draws the flap out—assuming that its weight is balanced by springs.

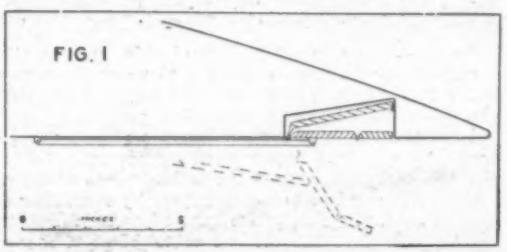
The possibility of the flap fluttering or fluctuating has been carefully investigated and there seems to be no possibility of this happening. For the car tests the flap was made very light, so that it was a true dynamic model in the region of 30 m.p.h., and it was tested at all speeds up to 60 m.p.h.; its moment of inertia was then trebled and the tests repeated right up the speed range. In this way a wide range was covered, representing flaps of a fraction of the weight of real flaps at the one extreme and flaps of many times their probable weight at the other extreme, and the degree of damping was very marked in all cases.

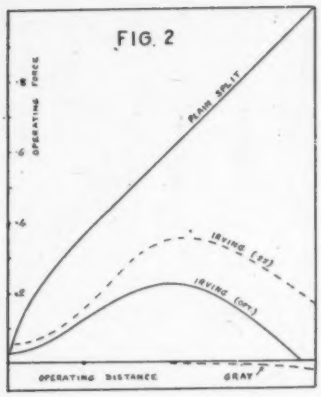
"Stalling" the Servo

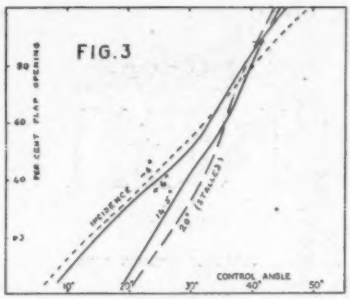
Only one unforeseen feature was discovered, namely, that it was possible by a very rapid movement of the control at the beginning of the opening to "stall" the controlling part by turning it within the wing so far and so quickly that the air did not cling to it long enough to open the flap properly; the result was that the flap took up a stable position very slightly open. This peculiarity can be easily avoided by arranging a stop to prevent the pilot moving his control to big angles until the flap has opened some way, should this prove necessary.

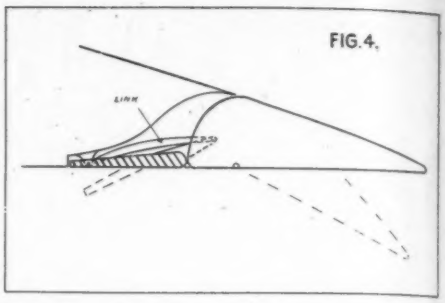
The tests were done on a wing of 30 in. chord by 80 in. span, mounted several feet above the car, and at speeds from 30 to 60 m.p.h., and of course they had to be done in calm air and on a good road surface; speeds were given by ordinary pitot, and hinge moments were recorded in graphical form with a simple spring arrangement. The flap span was 40 in. and its half-width was 3.3 in.

A plain split flap was also tested to get a direct comparison; unfortunately the only hinge moment test with the flap fixed as an Irving one was made with the drag arms running to the 0.25 half-chord position; this was suitable for the modified flap but not for the Irving one.









which was badly underbalanced; test runs had, however, been made with the drag arms further back and the flap had become overbalanced when fully open, as in Irving's tests. Fig. 2 gives force-deflection curves for the various arrangements of flap, and the forces are given in terms of that on the plain split flap at 90°, since it is the reduction and not the absolute values that it is desired to emphasise; the deflection represents distance moved by the rear edge of the flap and not projection from the wing under-surface, as plotted by Mr. Irving—for the whole point is variable drag, and this plotting gives a truer picture. The curve for the split flap is the average of readings at 5, 9 and 14 degrees incidence, while the balanced flap curves are for 4 degrees incidence only, as there seemed to be a little variation with incidence on the modified Irving flap. The upper Irving flap curve is with the unsuitable hinge, and the lower full curve is the estimated optimum that could have been obtained. The curve for the modified Irving design lies on the zero line for the first half of the opening and then falls below the line, since it is in closing the flap that the operating work is done.

Ease of Operation

The areas within the curves represent work done, of course, and the figure for the modified Irving flap is 0.7 per cent. of the plain split flap work. This of course is an absurdly low value, and great care had been taken to avoid friction in the design; the result was that at 30 m.p.h. it was difficult to feel the forces at all by hand, although the flap when fully open projected nearly 5 in. from the wing, and a number of independent experts who tried it found it difficult to believe. Translated into practice it means that the pilot could comfortably apply the flaps on an Armstrong Whitworth Ensign by means of a simple hand lever.

Fig. 3 gives the variation of flap opening with setting of the controlling surface, and it will be seen that the curves for different incidences show no drastic or sudden changes—even beyond the stall. From the behaviour of the flap on the car model under these fairly comprehensive tests one would not have the least hesitation in flying an aeroplane fitted with this indirectly-operated flap.

The drag arm length was 8.6 in. and the flap was hinged to the wing at a point 0.9 in. above the under-surface. For fuller details reference should be made to British Patent No. 476,673.

Improving the Slotted Flap

The second flap, which is shown in Fig. 4, is an attempt to improve upon the well-known Handley Page type of slotted flap. Three objects were aimed at in this design: first, to obtain closer balance while permitting the flap to be mounted on a simple hinge within its contour; secondly to reduce profile drag by giving a flush and reasonably airtight finish to the under-surface of the wing; and, thirdly, to give a better slot shape by permitting easier entry of air to the slot, in the hope of giving more lift. It will be seen that the method is to hinge a forwardly-projecting balancing and fairing surface to the nose of the slotted flap, and to control this balance surface by linking it suitably to the wing. As the main flap is depressed the nose of the balance surface also goes down, and so permits air to flow through the slot; so that for take-off a good flow of air through the slot should be obtained with little drag, while for landing the balance surface enables the flap to be set to large angles with greatly reduced hinge moments.

Points of Doubt

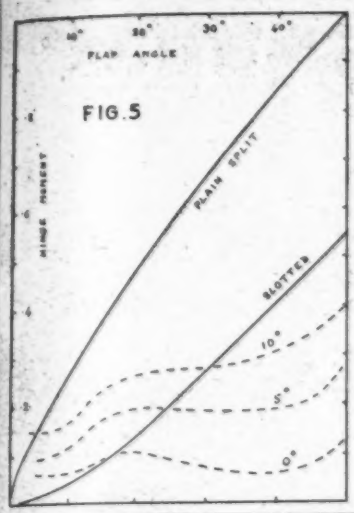
Two points were originally in some doubt, namely, whether the downwardly projecting nose of the balance surface would cause a wake that would add to the drag in the take-off condition, and, secondly, whether the shielding of the flap by the balance surface as they approached each other would make it difficult to obtain a close degree of balance in the system; on the other hand, the wide choice of size and of possible gearing arrangements seemed to offer scope for designing a good working compromise.

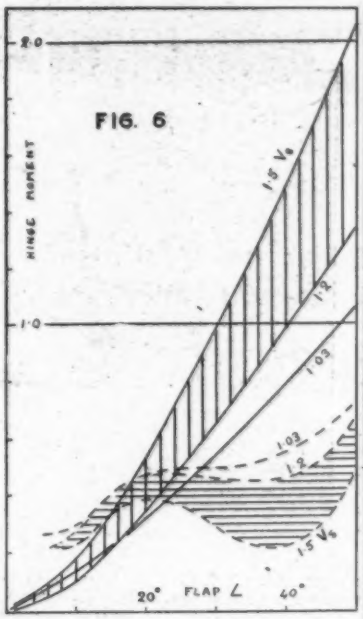
Since the lift with a slotted flap begins to fall off after about 50 degrees flap angle the design was limited to the range of settings up to that angle. The results of the tunnel tests on hinge-moment are given in Fig. 5, and again for purposes of comparison a plain split flap of the same size was also tested; that is to say, that at 90 degrees each flap projected equally from the wing. The wing section was, as used on the car tests already described, a Clark Y increased to 18 per cent. thickness but keeping the under-surface flat, and this will have a zero lift angle of about −8 degrees. To get as wide a flap chord as possible a short length of wing was fixed right across the tunnel, with the result that the stall began to develop at just over 10 degrees; due allowance must be made for these facts in interpreting the incidence values, and 5 degrees therefore represents the case of flying at approximately 1.2 times stalling speed while 0 degrees incidence represents a value of 1.5.

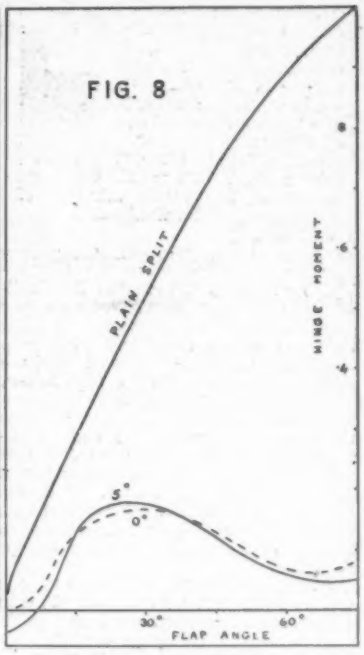
Hinge Moments

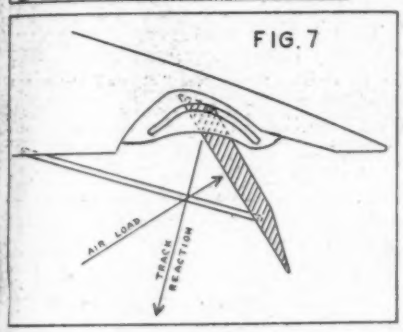
As before, the hinge moments are given in terms of the moment on a corresponding plain split flap at the same maximum angle—in this case 50 degrees. The slotted flap was tested without its balance surface and with the hinge at 0.25 of the flap chord and 0.075 flap chord below the surface, and it will be seen that the hinge moments are about half those of the split flap, especially at the bigger angles; the incidence of this test and of the plain split flap test was 5 degrees, and although tests were also made at 0 and 10 degrees the curves have been omitted, as in both flap cases they fell close to the 5-degree curves.

Several balance surface variations were tried, and the best one is given in the three curves for 0, 5 and 10 degrees incidence in Fig. 5. It was found that wide variations of balance or over-balance could be easily obtained, but in all cases there was a comparatively large change in balance with incidence; this appears inevitable, as the balance surface is obviously more effective at small incidences than near the stall, while at very high angles beyond the stall it would ultimately contribute nothing. In a way it is fortunate that the closer balance is obtained at the higher speeds, for this case can be designed for while the lower









speeds will look after themselves to a large extent. Now the range of speeds in which flaps are normally used is in the region of 1.2 to 1.5 times the stalling speed, for lower speeds are avoided by pilots because of doubtful stability, while higher ones are ruled out in most machines for the sake of the flap structure. The incidences of 0 and 5 degrees in these tunnel tests may therefore be taken as the flap range, and it will be seen that over the flap settings between 30 and 50 degrees (which the pilot would use for gliding angle control) the balanced design involves maximum hinge moments of about half the plain slotted type at the lower speeds and of less than a quarter at the higher speeds. This is brought out more clearly in Fig. 6, where the hinge moments have been re-plotted (in terms of the maximum moment on a slotted flap at the stall) for varying speeds; the shaded areas represent the used flap ranges, the upper one being for the plain slotted flap and the lower one for the balanced design.* It should be noted that the lower one is falling with speed increase whereas the upper one is rising; also that the upper curves are based on the separate incidence curves for that flap and not on the 5-degree curve only.

The flow past the under-side of the flap was studied carefully, and it was found that at all the larger flap openings there was a standing eddy of air between the flap and the balance surface, but that only a very little of it was carried away as a wake, and that in consequence there was quite a remarkably thin layer of turbulent air passing the flap trailing edge; its velocity was measured and found to be not much less than the full velocity just outside that region, so that the momentum loss will be small. This narrow wake was only a small fraction of the total wing wake, so that the take-off should hardly be affected.

No attempt was made to measure lift, owing to the low Reynolds Number available.

The third flap may perhaps best be described as an improvement on the once-well-known Zap type, and is shown in Fig. 7. Just why it did not occur to the Zap Corporation to allow the leading edge of the flap to move back along a suitably shaped track instead of limiting its motion to a straight line, is hard to say, for it seems a fairly obvious development—at any rate once it has occurred to one. It is clear that a track can be so shaped that the forces of air load, drag-arm tension, and track reaction all meet at one point (on the drag arm), thus leaving only the friction of the rollers and hinges to be overcome by the pilot. At least that is the case at any one incidence, but the point at once arises that change of incidence may so alter the air reaction as to quite upset the balance of forces, and some appreciable change was expected, judging by centre-of-pressure tests on plain split flaps at different incidences.

Effect of Incidence-change

The point that required investigation was whether the shielding of the nose part of the flap as it moved up into the wing would alter the characteristics for better or for worse, and it was to this end that a tunnel test was carried out. The wing was the same as in the previous test, and the flap had the same projected size at 75 degrees maximum setting as had the previous flaps at that angle. The track shape was unfortunately rather a bad first estimate, so that the hinge moments were far higher than they should have been; this, however, does not invalidate the main point of the test, which was to determine the change of moment with incidence. The results are given in Fig. 8, again compared with a plain split flap of the same size and angle, and only tests at 0 degrees and 5 degrees were made, as these represent the limits of the used flap range. It will be seen that the effect of change of incidence is remarkably small, while even with the bad track design used the operating forces are reduced to modest proportions. This flap, in fact, is in some ways the most attractive of the three, as it is simple and strong, while having light operating loads.

Tidying-up the Ends

THE Hellermann binding system for electric cables is described in detail in a leaflet issued by Hellermann Electric, Ltd., 1-2, Savoy Parade, London Road, Croydon. This system is a process of finishing-off the ends of covered and braided electrical conductors with elastic rubber sleeves by the aid of special tools.

A group at the Handley Page Works on the occasion of a visit by the French Air Minister, M. Guy La Chambre, to see the high-speed production of Hampdens. Left to right are Maj. J. S. Buchanan, Deputy Director-General of Production, Air Ministry; M. Mazer; M. La Chambre; Mr. F. Handley Page; Lt. Col. Fournier, French Air Attaché; and Mr. Hamilton, a director and works manager of H.P., Ltd.

Moth Minors in Production

PRODUCTION of both the De Havilland Moth Minor and Gipsy Minor engine is now well under way. No fewer than twenty-one clubs and schools in Great Britain alone are said to have placed orders for the open type Minor, which, incidentally, will be the kind on which the works will concentrate for the time being. Towards the end of the summer production of the coupé version will commence. De Havillands report large export orders in hand for clients in Australia, India, Canada, South Africa, Rhodesia, New Zealand, and a number of European and other foreign countries.

As regards the Gipsy Minor engine, aircraft manufacturers will be interested to know that the deliveries can be expected for home or export use as from May.

Steel Data at a Glance

A USEFUL "hang-up" data card is available from Aircraft Materials, Ltd., of Midland Road, London, N.W.1. It contains data on mechanical test characteristics of over twenty steels, hardness scales and corresponding tensile strengths, recommended heat treatment, and chemical analysis.

Off to the States

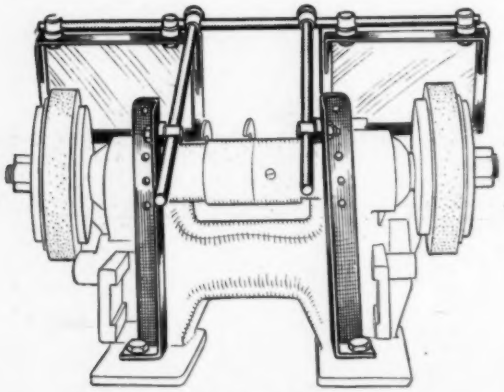
CAPTAIN HUBERT BROAD would like friends in this country and on the other side of the Atlantic to know that he is leaving for America on April 28. He expects to be back in about a month, and hopes to fix up certain business deals of which we shall be told on his return.

Safety in the Machine Shop

IN order that certain machine tools shall comply with the regulations of the new Factory Act, a new safety shield has been produced by Weathershields, Ltd., 48, Moor Street, Birmingham, for grinding machines, spot welders, metal band saws, turning lathes and guillotine machines.

In its construction, a framework is bolted to the machine tool and the shields are held on adjustable arms which may be locked in any desired position. The shields themselves are formed of safety glass, but on the inner side of this there is a square of 32-oz. plain glass. Thus, any pitting or cracking affects only the plain glass, which may be instantly and cheaply replaced, while the safety glass remains intact.

The type shown in the illustration is a grinding wheel guard, and, in its standard form, it costs £1 15s.



The machine safety shield described above.

NEW COMPANIES.

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

AIRPORT EQUIPMENT, LTD.—Private company, registered March 13. Capital £10,000 in 10,000 shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in machinery and equipment for the aircraft, oil, transport and allied industries, manufacturers of aircraft and motor vehicles or boats, component parts, refuelling units, pumps and trailers, etc. The directors are: Walter de B. Thomas, master mariner; John N. Walford, director of Trailer Appliance Co., Ltd. Registered office: Trailex Works, North End Road, Wembley Park, Mdx.

THE MODERN SEAMLESS TUBE COMPANY, LIMITED, was registered as a private company on March 11, with a nominal capital of £50,000 in 200,000 shares of 5s. each. The objects are to carry on the business of tube extruding engineers, manufacturers of all aircraft products, grinders, smiths, machinists and patentees and licensees of aeroplane and other inventions and devices, etc. The directors are: Edmund Howard, chartered surveyor (permanent director and chairman); Alfred L. Miller, engineer; Stanley Palmer. Registered office: 42, Bloomsbury St., W.C.1.

NORTH-WESTERN AIR TRANSPORT, LTD.—Private company, registered March 24. Capital, £5,000 in £1 shares. Objects: To carry on competitive and commercial flying and aerial transport services of all kinds, etc. The directors are: John M. Temple, Geo. E. B. Storey. Solicitors: Field, Lindsay & Dave, Liverpool.

DAWN EXPRESS, LTD.—Private company, registered March 15. Capital, £100 in 100 shares of £1 each. Objects: To operate lines of aeroplanes; to carry on the business of transport contractors and carriers by aeroplanes or other means of transport, etc. The directors are: Mildred M. Bruce and Eric E. Noddings (directors of Air Dispatch, Ltd.). Registered office: Air Port of London, Croydon.

AUSTIN & McLEAN, LTD.—Private company, registered March 17. Capital, £3,000 in £1 shares. Objects: To carry on the business of engineers, manufacturers of and dealers in forgings, castings, guns, projectiles, motor cars, aeroplanes, ironmongery, wireless goods, etc. The directors are: Harold E. Austin and Wm. B. Austin. Registered offices: 124, Old Christchurch Road, Bournemouth.

STRAIGHT AVIATION TUITION LTD., registered as a private company on March 30 with a nominal capital of £5,000 in 5,000 shares of £1 each. Objects: To establish and conduct, either alone or in conjunction with others, or pursuant to any scheme laid down by the Air Ministry or other authority, schools or colleges at which students may obtain sound education, instruction and training in flying and all matters pertaining to air navigation. The subscribers are:—Whitney W. Straight and Owen G. E. Roberts.

PROVINCIAL AIR SCHOOLS, LTD. Private company, registered March 31. Capital, £2,000 in 2,000 shares of £1 each. Objects: to establish, equip and carry on an aviation school, and to teach the science or art of aerial navigation, etc. The subscribers are:—Sidney F. Newbery, 16, Marston Gardens, Luton and Wm. Gibbard.

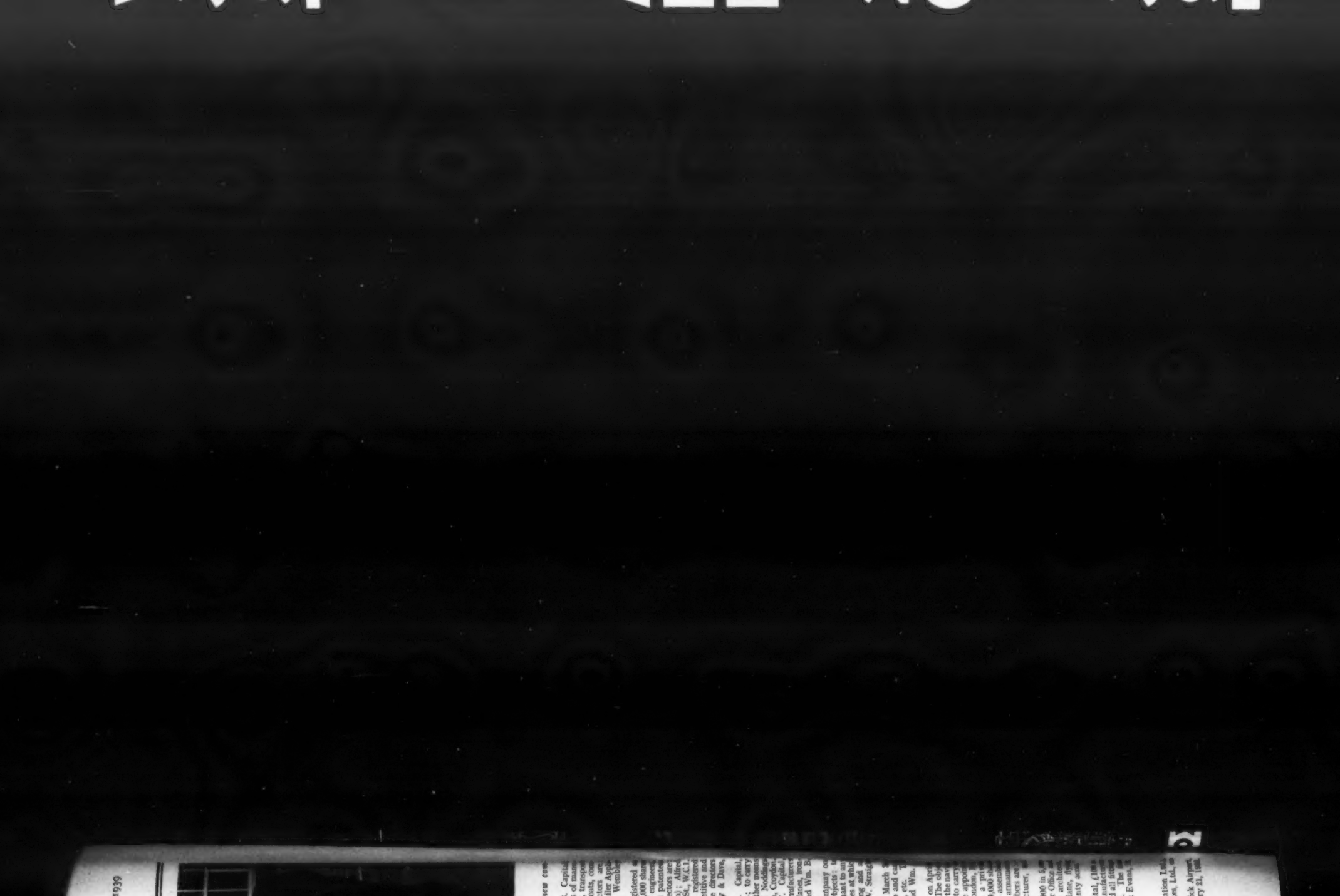
AIR-TRACK (AVIATION) LTD., was registered as a private company on April with a nominal capital of £10,000 in 10,000 ordinary shares of £1 each. The objects are to acquire patents and inventions relating to systems and devices for the navigation and landing of aircraft of all types by wireless or other means and to carry on the business of aeronautical engineers, etc. The first directors are to be appointed by the subscribers. Solicitors: Slaughter and May, 18, Austin Friars, London, E.C.

SCOTTISH AIRCRAFT COMPONENTS LTD., was registered as a private company in Edinburgh on April 6 with a nominal capital of £10,000 in 10,000 shares of £1 each. The objects are to carry on the business of manufacturers, assemblers and repairers of all kinds of structural work, appliances, machinery, armament and munitions, whether for use in air or by land or sea, etc. The subscribers are: Andrew McCance, 195, West George Street, Glasgow, steel manufacturer, and Norman W. Duthie.

UFFA FOX LTD. Private company, registered April 3. Capital, £5,000 in 5,000 shares of £1 each. Objects: To carry on the business of Admiralty, War Office and Air Force contractors, shipbuilders, boat builders and designers, naval architects and marine surveyors, motor vehicle manufacturers, aeroplane, seaplane, flying boat and airship builders, etc. Permanent directors:—Uffa Fox, "Twenty acres," Whippingham, I.W., yacht designer and builder and Miss Elfreda Fox.

SAFETY TANKS LTD. Private company, registered April 1. Capital, £100 in 100 ordinary shares of £1 each. Objects: To carry on the business of manufacturers and factors of tanks and vessels for petrol, oil and other substances, and all fittings appurtenant thereto for the aeronautical, motor and other industries, etc. The first directors are to be appointed by the subscribers. Solicitors: Bowman & Evans, 38, Waterloo St., Birmingham.

CHANGE OF NAME

AVIATION EQUIPMENT & EXPORT LTD. (Formerly Millar Aviation Ltd.), 28, Bolton Street, Piccadilly, W.1. Name changed to Aviation Corporates, Ltd., on February 9, 1939.

SOUTHERN MOTORS AND AIRCRAFT (CROYDON) LTD (Gatwick Airport, Surrey).—Name changed to Southern Aircraft (Gatwick) Ltd., on February 21, 1939.